737-73V

Flight Crew Operations Manual

easyJet

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Copyright Information

June 9, 2006

Preface — Chapter 0
Table of Contents — Section 0

Volume 1 **Chapter**

Volume 2

Quick Reference Handbook (QRH)

General

The airplanes listed in the table below are covered in the Flight Crew Operations Manual (FCOM). The table information is used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplanes.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation number are supplied by Boeing.

Airplane Number	Registry Number	Serial Number	Tabulation Number
001	G-EZJA	30235	YB101
002	G-EZJB	30236	YB102
003	G-EZJC	30237	YB103
004	G-EZJD	30242	YB104
005	G-EZJE	30238	YB105
006	G-EZJF	30243	YB106
007	G-EZJG	30239	YB107
008	G-EZJH	30240	YB108
009	G-EZJI	30241	YB109
010	G-EZJJ	30245	YB110
011	G-EZJK	30246	YB111
012	G-EZJL	30247	YB112
013	G-EZJM	30248	YB113
014	G-EZJN	30249	YB114
015	G-EZJO	30244	YB115
016	G-EZJP	32412	YB116
017	G-EZJR	32413	YB117
018	G-EZJS	32414	YB118
019	G-EZJT	32415	YB119
020	G-EZJU	32416	YB120
021	G-EZJV	32417	YB121

Airplane Number	Registry Number	Serial Number	Tabulation Number
022	G-EZJW	32418	YB122
023	G-EZJX	32419	YB123
024	G-EZJY	32420	YB124
025	G-EZJZ	32421	YB125
026	G-EZKA	32422	YB126
027	G-EZKB	32423	YB127
028	G-EZKC	32424	YB128
029	G-EZKD	32425	YB129
030	G-EZKE	32426	YB130
031	G-EZKF	32427	YB131
032	G-EZKG	32428	YB132

General

This Flight Crew Operations Manual (FCOM) has been prepared by The Boeing Company. The purpose of this manual is to:

- provide the necessary operating limitations, procedures, performance, and systems information the flight crew needs to safely and efficiently operate the 737 airplane during all anticipated airline operations
- serve as a comprehensive reference for use during transition training for the 737 airplane
- serve as a review guide for use in recurrent training and proficiency checks
- provide necessary operational data from the FAA approved Airplane Flight Manual (AFM) to ensure that legal requirements are satisfied
- establish standardized procedures and practices to enhance Boeing operational philosophy and policy.

This manual is prepared for the owner/operator named on the title page specifically for the airplanes listed in the "Model Identification" section. It contains operational procedures and information, which apply only to these airplanes. The manual covers the Boeing delivered configuration of these airplanes. Changes to the delivered configuration are incorporated when covered by contractual revision agreements between the owner/operator and The Boeing Company

This manual is not suitable for use for any airplanes not listed in the "Model Identification" section. Further, it may not be suitable for airplanes that have been transferred to other owners/operators.

Owners/operators are solely responsible for ensuring the operational documentation they are using is complete and matches the current configuration of the listed airplanes. This includes the accuracy and validity of all information furnished by the owner/operator or any other party. Owners/operators receiving active revision service are responsible to ensure that any modifications to the listed airplanes are properly reflected in the operational procedures and information contained in this manual.

This manual is structured in a two–volume format with a Quick Reference Handbook (QRH). Volume 1 includes operational limitations, normal and supplementary procedures, and dispatch performance data. Volume 2 contains systems information. The QRH contains all checklists necessary for normal and non–normal procedures as well as in–flight performance data.

The manual is periodically revised to incorporate pertinent procedural and systems information. Items of a more critical nature will be incorporated in operational bulletins and distributed in a timely manner. In all cases, such revisions and changes must remain compatible with the approved AFM with which the operator must comply. In the event of conflict with the AFM, the AFM shall supersede.

This manual is written under the assumption that the user has had previous multi–engine jet aircraft experience and is familiar with basic jet airplane systems and basic pilot techniques common to airplanes of this type. Therefore, the FCOM does not contain basic flight information that is considered prerequisite training.

Any questions about the content or use of this manual can be directed to:

Manager, Flight Training and Technical Data
737 Model
Boeing Commercial Airplane Groups
P. O. Box 3707, M/C 20–89
Seattle, Washington 98124–2207 USA

Organization

The FCOM is organized in the following manner.

Volume 1

- Preface – contains general information regarding the manual's purpose, structure, and content. It also contains lists of abbreviations, a record of revisions, bulletins, and a list of effective pages.
- Limitations and Normal Procedures chapters cover operational limitations and normal procedures. All operating procedures are based on a thorough analysis of crew activity required to operate the airplane, and reflect the latest knowledge and experience available.
- Supplementary Procedures chapter covers those procedures accomplished as required rather than routinely on each flight.
- Performance Dispatch chapter contains performance information necessary for self dispatch.

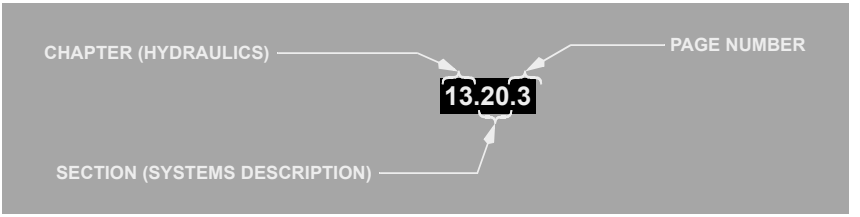
Volume 2 – Chapters 1 through 15 contain general airplane and systems information. These chapters are generally subdivided into sections covering controls and indicators and systems descriptions.

Quick Reference Handbook (QRH) – The QRH covers normal checklists, in–flight performance, non–normal checklists, and non–normal maneuvers.

Page Numbering

The FCOM uses a decimal page numbering system. The page number is divided into three fields; chapter, section, and page. An example of a page number for the hydraulics chapter follows: chapter 13, section 20, page 3.

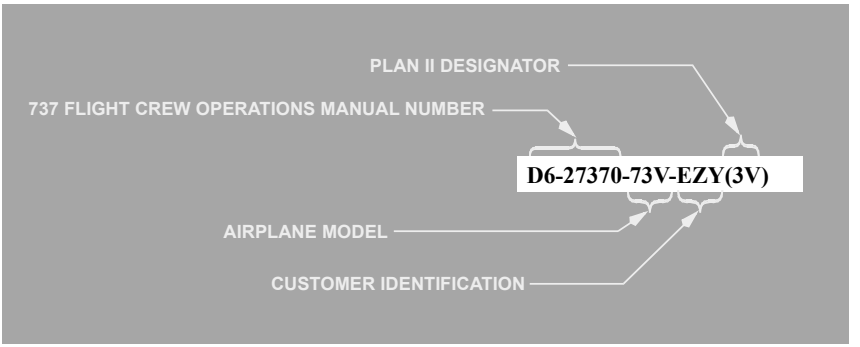
Example Page Number



Page Identification

Each page is identified by a customer document number and a page date. The customer document number is composed of the general 737 FCOM number, D6–27370–, and is followed by the airplane model and customer identification.

Example Page Identification



Warnings, Cautions, and Notes

The following levels of written advisories are used throughout the manual.

WARNING: An operating procedure, technique, etc., that may result in personal injury or loss of life if not carefully followed.

CAUTION: An operating procedure, technique, etc., that may result in damage to equipment if not carefully followed.

Note: An operating procedure, technique, etc., considered essential to emphasize. Information contained in notes may also be safety related.

Flight Crew Operations Manual Configuration

Customer airplane configuration determines the data provided in this manual. The Boeing Company keeps a list of each airplane configuration as it is built and modified through the service bulletin process. The FCOM does not reflect customer originated modifications without special contract provisions.

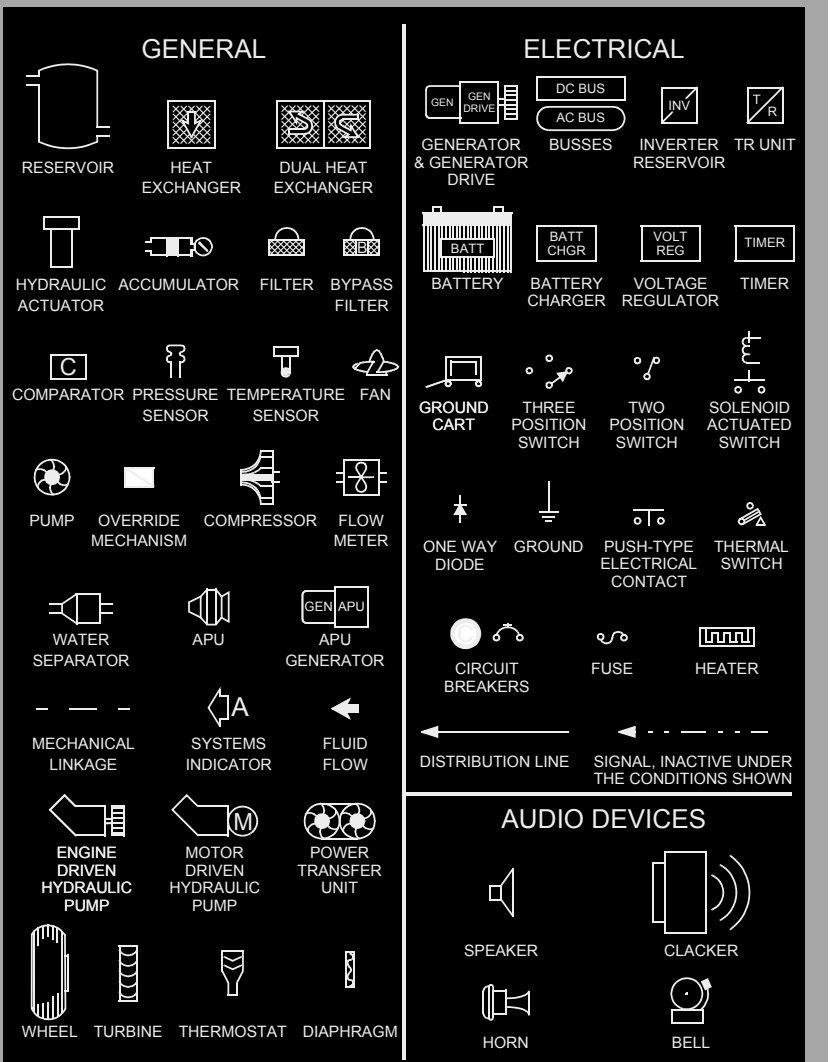
Special Note <EZY>

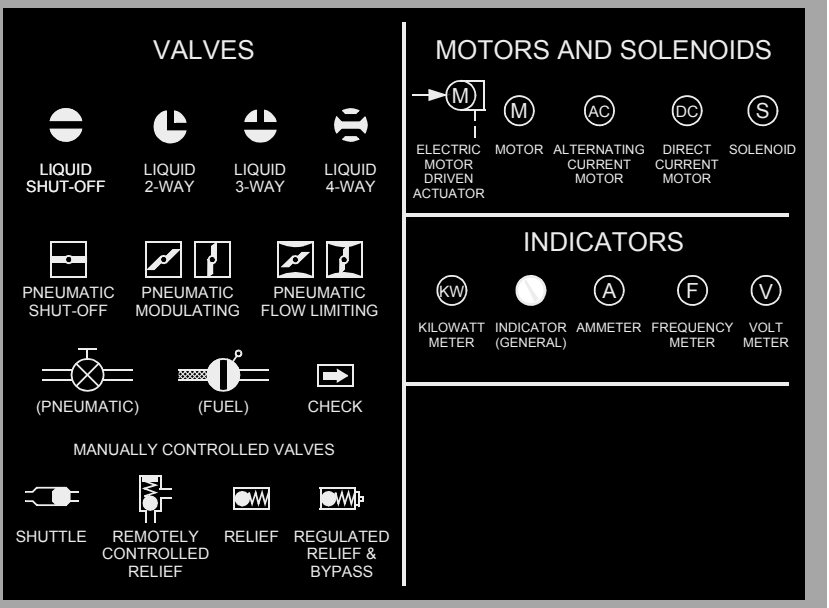
This FCOM contains information which has been included at the request of easyJet to airplanes covered by this manual. This information may differ from Boeing recommended information. By including this information in the manual, Boeing is providing a publishing service only and such inclusion does not imply that The Boeing Company in any way endorses or approves such information. The technical accuracy and validity of all such airline originated information, and its effect, if any, on other portions of this manual, is the sole responsibility of easyJet.

easyJet originated information is identified by a three letter code, surrounded by brackets (e.g., < EZY >), in the title of the procedure, section, or illustration containing this information in all sections except Non-Normal checklists. The Non-Normal checklists are identified by bracketed titles (e.g., < UNCOMMANDED RUDDER >) only. easyJet originated information is also uniquely identified by revision dots as shown in the margin of this paragraph.

Schematic Symbols

Symbols shown are those which may not be identified on schematic illustrations.





General

The following abbreviations may be found throughout the manual. Some abbreviations may also appear in lowercase letters. Abbreviations having very limited use are explained in the chapter where they are used.

A	
AC	Alternating Current
ACARS	Aircraft Communications Addressing and Reporting System
ACP	Audio Control Panel
ACT	Active
ADF	Automatic Direction Finder
ADIRS	Air Data Inertial Reference System
ADIRU	Air Data Inertial Reference Unit
ADM	Air Data Module
AFDS	Autopilot Flight Director System
AED	Automatic External Defibrillator
AFM	Airplane Flight Manual (FAA approved)
AGL	Above Ground Level
AI	Anti–Ice
AIL	Aileron
ALT	Altitude
ALTN	Alternate
AM	Amplitude Modulation
ANP	Actual Navigation Performance
ANT	Antenna
AOA	Angle of Attack
A/P	Autopilot
APP	Approach
APU	Auxiliary Power Unit
ARINC	Aeronautical Radio, Incorporated
ARPT	Airport
A/T	Autothrottle
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATT	Attitude
AUTO	Automatic
AUX	Auxiliary
AVAIL	Available
B	
BAC	Back Course
BARO	Barometric
B/CRS	Back Course
BCS	Back Course
BRT	Bright

BTL DISCH	Bottle Discharge (fire extinguishers)
B/C	Back Course
C	
C	Captain Celsius Center
CANC/ RCL	Cancel/Recall
CAPT	Captain
CB	Circuit Breaker
CDS	Common Display System
CDU	Control Display Unit
CG	Center of Gravity
CHKL	Checklist
CLB	Climb
COMM	Communication
CON	Continuous
CONFIG	Configuration
CRS	Course
CRZ	Cruise
CTL	Control
D	
DC	Direct Current
DDG	Dispatch Deviations Guide
DEP ARR	Departure Arrival
DES	Descent
DEU	Display Electronic Unit
DISC	Disconnect
DME	Distance Measuring Equipment
DSP	Display Select Panel
DSPL	Display
E	
E/D	End of Descent
E/E	Electrical and Electronic
EEC	Electronic Engine Control
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Proximity Warning System
EGT	Exhaust Gas Temperature
ELEC	Electrical
ELEV	Elevator
EMER	Emergency
ENG	Engine
EO	Engine Out
ETOPS	Extended Range Operation with Twin Engine Airplanes
EVAC	Evacuation
EXEC	Execute
EXT	Extend
F	
F	Fahrenheit
FAC	Final Approach Course
FCOM	Flight Crew Operations Manual
FCTL	Flight Control
F/D or FLT DIR	Flight Director

FMA	Flight Mode Annunciations
FMC	Flight Management Computer
FMS	Flight Management System
F/O	First Officer
FPA	Flight Path Angle
FPM	Feet Per Minute
FPV	Flight Path Vector
FREQ	Frequency
FT	Feet
FWD	Forward
G	
GA	Go–Around
GEN	Generator
GLS	GPS Landing System or GNSS Landing System
G/P	Glidepath
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
GS	Ground Speed
G/S	Glide Slope
H	
HDG	Heading
HDG REF	Heading Reference
HDG SEL	Heading Select
HF	High Frequency
HPA	Hectopascals
HUD	Head-Up Display
HYD	Hydraulic
I	
IAN	Integrated Approach Navigation
IAS	Indicated Airspeed
IDENT	Identification
IFE	In-Flight Entertainment System
IGN	Ignition
IN	Inches
IND LTS	Indicator Lights
ILS	Instrument Landing System
INBD	Inboard
INOP	Inoperative
INT or INTPH	Interphone
INTC CRS	Intercept Course
IRS	Inertial Reference System
ISFD	Integrated Standby Flight Display
ISLN	Isolation
K	
K	Knots
KGS	Kilograms
KIAS	Knots Indicated Airspeed
L	
L	Left
LBS	Pounds
LDA	Localizer type Directional Aid
LDG ALT	Landing Altitude

LIM	Limit
LNAV	Lateral Navigation
LOC	Localizer
LWR CTR	Lower Center
LWR DSPL	Lower Display
M	
M	Mach
MAG	Magnetic
MAN	Manual
MCP	Mode Control Panel
MDA	Minimum Descent Altitude
MEL	Minimum Equipment List
MFD	Multifunction Display
MHZ	Megahertz
MIC	Microphone
MIN	Minimum
MKR	Marker
MMO	Maximum Mach Operating Speed
MOD	Modify
MSG	Message
MTRS	Meters
MUH	Minimum Use Height
N	
NAV RAD	Navigation Radio
ND	Navigation Display
NM	Nautical Miles
NORM	Normal
NPS	Navigation Performance Scales
N1	Low Pressure Rotor Speed
N2	High Pressure Rotor Speed
O	
OAT	Outside Air Temperature
OFST	Offset
OHU	Overhead Unit
OUTBD DSPL	Outboard Display
OVHD	Overhead
OVHT	Overheat
OVRD	Override
OXY or O2	Oxygen
P	
PA	Passenger Address
PASS	Passenger
PERF INIT	Performance Initialization
PF	Pilot Flying
PFC	Primary Flight Computers
PFD	Primary Flight Display
PM	Pilot Monitoring
PNF	Pilot Not Flying
PNL	Panel
POS	Position
PREV	Previous
PROX	Proximity
POS INIT	Position Initialization

PRI	Primary
PSI	Pounds Per Square Inch
PTH	Path
PTT	Push To Talk
PWR	Power
PWS	Predictive Windshear System
R	
R	Right
RA	Radio Altitude Resolution Advisory
RDMI	Radio Distance Magnetic Indicator
REC	Recorder
RECIRC	Recirculation
REF	Reference
RET	Retract
RF	Refill
RNP	Required Navigation Performance
RPM	Revolutions Per Minute
RST	Reset
RTE	Route
RTO	Rejected Takeoff
RTP	Radio Tuning Panel
RUD	Rudder
RVSM	Reduced Vertical Separation Minimum
S	
SAT	Static Air Temperature
S/C	Step Climb
SDF	Simplified Directional Facility
SELCAL	Selective Calling
SEL	Select
SPD	Speed
STA	Station
STAB	Stabilizer
STAT	Status
STBY	Standby
STD	Standard
SYS	System
T	
T or TRU	True
T or TK or TRK	Track
TA	Traffic Advisory
TAS	True Airspeed
TAT	Total Air Temperature
T/C	Top of Climb
TCAS	Traffic Alert and Collision Avoidance System
TDZE	Touch Down Zone Elevation
T/D	Top of Descent
TEMP	Temperature
TERR	Terrain
TFC	Traffic
TFR	Transfer
THR HOLD	Throttle Hold
TO	Takeoff

TO/GA	Takeoff/Go–Around
TRU	Transformer Rectifier Unit
U	
UNLKD	Unlocked
USB	Upper Side Band
UPR DSPL	Upper Display
UTC	Coordinated Universal Time
UTIL	Utility
V	
VA	Design Maneuvering Speed
VANP	Vertical Actual Navigation Performance
VERT	Vertical
VHF	Very High Frequency
VMO	Maximum Operating Speed
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
VR	Rotation Speed
VREF	Reference Speed
VRNP	Vertical Required Navigation Performance
VSD	Vertical Situation Display
VSI	Vertical Speed Indicator
V/S	Vertical Speed
VTK	Vertical Track
V1	Takeoff Decision Speed
V2	Scheduled Takeoff Target Speed

W	
WPT	Waypoint
WXR	Weather Radar
X	
XPDR or XPNDR	Transponder
XTK	Cross Track

Revision Transmittal Letter

To: All holders of easyJet 737 Flight Crew Operations Manual (FCOM), Boeing Document Number D6-27370-73V-EZY(3V).

Subject: Flight Crew Operations Manual Revision.

This revision reflects the most current information available to The Boeing Company 45 days before the subject revision date. The following revision highlights explain changes in this revision. General information below explains the use of revision bars to identify new or revised information.

Revision Record

No.	Revision Date	Date Filed
0	July 28, 2000	
2	October 15, 2001	
4	May 24, 2002	
6	March 31, 2003	
8	March 29, 2004	
10	March 28, 2005	
12	June 9, 2006	

No.	Revision Date	Date Filed
1	May 15, 2001	
3	March 15, 2002	
5	October 31, 2002	
7	September 26, 2003	
9	September 27, 2004	
11	December 2, 2005	

General

The Boeing Company issues FCOM revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued FCOM bulletins.

The revision date is the approximate date the manual is approved for printing. The revision is mailed a few weeks after this date.

Formal revisions include a Transmittal Letter, a new Revision Record, Revision Highlights, and a current List of Effective Pages. Use the information on the new Revision Record and List of Effective Pages to verify the FCOM content.

Pages containing revised technical material have revision bars associated with the changed text or illustration. Editorial revisions (for example, spelling corrections) may have revision bars with no associated highlight.

The Revision Record should be completed by the person incorporating the revision into the manual.

Filing Instructions

Consult the List of Effective Pages (0.5). Pages identified with an asterisk (*) are either replacement pages or new (original) issue pages. Remove corresponding old pages and replace or add new pages. Remove pages that are marked DELETED; there are no replacement pages for deleted pages.

Be careful when inserting changes not to throw away pages from the manual that are not replaced. Using the List of Effective Pages (0.5) can help determine the correct content of the manual.

Revision Highlights

This section (0.4) replaces the existing section 0.4 in your manual.

Throughout the manual, airplane effectivity may be updated to reflect coverage as listed on the Preface - Model Identification page, or to show service bulletin airplane effectivity. Highlights are not supplied.

This manual is published from a database; the text and illustrations are marked with configuration information. Occasionally, because the editors rearrange the database markers, or mark items with configuration information due to the addition of new database content, some customers may receive revision bars on content that appears to be unchanged. Pages may also be republished without revision bars due to slight changes in the flow of the document.

Chapter L - Limitations

Section 10 - Operating Limitations

Autopilot/Flight Director System

L.10.3 - Added limit to define maximum (3.25 degrees) and minimum (2.5 degrees) glideslope angles for automatic landing.

Look-Ahead Terrain Alerting (GPWS)

L.10.5 - Removed Non-AFM Operational Information. All 737NG radars are ARINC 708 compliant and have no standoff restrictions.

Chapter NP - Normal Procedures

Section 11 - Introduction

Crew Duties

NP.11.2 - Added new item to the Pilot Monitoring duties.

Section 21 - Amplified Procedures

Preliminary Preflight Procedure – Captain or First Officer

NP.21.2 - Deleted amplifying information because this does not apply on the ground when the EEC's are not powered.

Descent Procedure [AD 2002-19-52 and AD 2002-24-51]

NP.21.40 - The procedural step of verifying VREF by the PF is expanded to include an action by the PM, thereby ensuring a proper cross-check.

Descent Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51]

NP.21.41 - The procedural step of verifying VREF by the PF is expanded to include an action by the PM, thereby ensuring a proper cross-check.

Descent Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51 for Airplanes with Master Caution System Logic Change and Automatic Shutoff]

NP.21.43 - The procedural step of verifying VREF by the PF is expanded to include an action by the PM, thereby ensuring a proper cross-check.

Shutdown Procedure

NP.21.49 - Returned FASTEN BELTS....OFF step to after engine shutdown for Boeing model standardization.

Chapter SP - Supplementary Procedures

Section 2 - Air Systems

Manual Mode Operation

SP.2.3 - Reformatted procedure structure for cross-model standardization.

Automatic Pressurization Control – Departure Airport Elevation Above 9500 Feet

SP.2.4 - Modified procedure for airplanes configured with a high altitude landing switch.

Section 6 - Electrical

Electrical Power Up

SP.6.1 - Deleted information about the flight deck auxiliary power outlets.

Section 7 - Engines, APU

Battery Start

SP.7.1 - Added ISFD preflight information.

SP.7.1 - Removed redundant steps.

Section 10 - Flight Instruments, Displays

Altimeter Difference

SP.10.1 - Boeing Engineering has determined that a 500 foot tolerance above 29,000 feet is acceptable.

Section 11 - Flight Management, Navigation

Inhibiting GPS Updating

SP.11.15 - Added text for Boeing cross-model commonality.

Chapter PD - Performance Dispatch

Section 11 - Enroute

Net Level Off Weight

PD.11.7 - Revised data to reflect speed and drag change.

Section 12 - Landing

Landing Climb Limit Weight

PD.12.5 - Clarified footnote. No change in data.

Go-Around Climb Gradient

PD.12.6 - Clarified footnote. No change in data.

Section 13 - Text

Takeoff

PD.13.1 - New methodology used for calculating line-up allowance based on ICAO recommended tire face safety margin (Dimension "M") for both the main and nose gears throughout the maneuver.

Chapter 1 - Airplane General, Emergency Equipment, Doors, Windows

Section 40 - Systems Description

Oxygen System Schematic

1.40.6 - Removed 14,000 FT from the Barometric Pressure Switch box. Customer specific altitudes may be different and are stated in the text.

Chapter 3 - Anti-Ice, Rain

Section 10 - Controls and Indicators

Window Heat Panel

3.10.1 - Revised description of window heat lights.

Chapter 4 - Automatic Flight

Section 20 - System Description

Autopilot Disengagement

4.20.2 - Added autopilot disengagement criteria to match fleet FCC software configuration.

Automatic Flight Approach and Landing

4.20.12 - Revised sentence to clarify localizer capture.

Chapter 6 - Electrical

Section 10 - Controls and Indicators

AC and DC Metering Panel

6.10.6 - Revised information to include "other power systems".

Chapter 7 - Engines, APU

Section 11 - Over/Under – Displays

Total Air Temperature, Thrust Mode Display, Selected Temperature and Autothrottle Limit

7.11.2 - Added new information for thrust mode display annunciation.

Chapter 10 - Flight Instruments, Displays

Section 11 - PFD/ND – Displays

PFD Airspeed Indications – Takeoff and Approach

10.11.9 - Changed description to specify flap lever movement.

Section 21 - PFD/ND System Description

Aircraft Condition Monitoring System (ACMS)

10.21.16 - Reformatted ACMS description.

Section 41 - PFD/ND Navigation Displays

Map

10.41.11 - Removed full time display condition for MAP mode.

TCAS

10.41.14 - Deleted 3 nm TCAS range ring.

10.41.14 - Removed reference to absolute altitude.

10.41.15 - Removed "if traffic is selected" display condition.

Chapter 11 - Flight Management, Navigation

Section 41 - FMC Takeoff and Climb

Climb Phase

11.41.2 - Added text describing VNAV operation for FMCs with U10.6 and earlier.

Progress Page 1/X

11.41.12 - Added "MOD" to destination line to better reflect text description of item # 4.

Section 42 - FMC Cruise

Lateral Offset

11.42.15 - Deleted redundant Progress page as the same information is covered in the Progress page section of 11.41.

Chapter 15 - Warning Systems

Section 20 - System Description

Cabin Altitude Warning

15.20.5 - Added information on Cabin Altitude Warning Horn.

Chapter NC - Normal Checklists

NC.1 - Revised the trim checklist item to read "Rudder and aileron trim.....Free and 0." The stabilizer trim setting checklist item is moved to the BEFORE TAKEOFF NC.

NC.2 - Added "Stabilizer trim.....___ Units." This is to ensure that the stabilizer trim setting is verified after doing the SP-16 procedure - "Exterior De-icing."

Chapter CI - Checklist Introduction

Section 2 - Non-Normal Checklists

Non–Normal Checklist Use

CI.2.4 - Revised so that when doing a non-normal checklist when stopped on the ground, actions are taken based on area of responsibility for the preflight.

CI.2.4 - Added guidance to get agreement before moving critical controls during the accomplishment of a Non-Normal procedure.

Chapter NNC - Non-Normal Checklists

Section 0 - Unannunciated Checklists

CABIN ALTITUDE WARNING OR RAPID DEPRESSURIZATION

0.8 - Revised statement for clarity.

WARNING HORN - CABIN ALTITUDE OR CONFIGURATION

0.36 - Added new Non-Normal procedure to clarify the appropriate pilot action/response to the warning horn. This change also deletes the CONFIGURATION WARN NNC.

WINDOW DAMAGE

0.38-39 - Deleted Eyebrow Window information.

0.39 - Added window three heat.

Section 1 - Airplane General, Emer. Equip., Doors, Windows

WINDOW DAMAGE

1.6-7 - Deleted Eyebrow Window information.

1.6-7 - Added window three heat.

Section 2 - Air Systems

CABIN ALTITUDE WARNING OR RAPID DEPRESSURIZATION

2.4 - Revised statement for clarity.

Section 7 - Engines, APU

ENGINE TAILPIPE FIRE

7.16 - Deleted redundant information.

7.16 - Added clarifying information.

Section 8 - Fire Protection

ENGINE TAILPIPE FIRE

8.9 - Deleted redundant information.

8.9 - Added clarifying information.

Section 13 - Hydraulics

MANUAL REVERSION

13.8 - Added step for clarity.

Section 14 - Landing Gear

GEAR LEVER WILL NOT MOVE UP AFTER TAKEOFF

14.2 - The checklist is not clear in that the flight crew expects that pulling the takeoff warning cutoff circuit breaker will silence the horn. If the horn does not silence after pulling the circuit breaker (air/ground system failure) the amplifying infomation explains what the flight crew can expect.

14.2 - The checklist is not clear in that the flight crew expects that pulling the takeoff warning cutoff circuit breaker will silence the horn. If the horn does not silence after pulling the circuit breaker (air/ground system failure) the amplifying infomatio

Section 15 - Warning Systems

WARNING HORN - CABIN ALTITUDE OR CONFIGURATION

15.2 - Added new Non-Normal procedure to clarify the appropriate pilot action/response to the warning horn. This change also deletes the CONFIGURATION WARN NNC.

Chapter MAN - Maneuvers

Section 1 - Non-Normal Maneuvers

Nose High Recovery

MAN.1.9 - Restructured text for standardization.

Section 2 - Flight Patterns

Takeoff

MAN.2.1 - Revised profile to include engine-out information.

ILS Approach - Fail Passive

MAN.2.2 - Changed dual "channel" to dual "autopilot" for cross model standardization. "Dual channel" is not defined in Vol. 2. Also changed Minimum Single Autopilot Use Altitude to the more correct MUH definition.

Chapter PI - Performance Inflight

Section 10 - General

Takeoff Speeds - Dry Runway

PI.10.1-2 - Extended data up to 10000 ft pressure altitude.

Takeoff Speeds - Wet Runway

PI.10.3-4 - Extended data up to 10000 ft pressure altitude.

Section 13 - Engine Inoperative

Long Range Cruise Altitude Capability

PI.13.8 - Clarified footnote. No change in data.

Section 16 - Text

Introduction

PI.16.3 - Removed recommendation note. Decision for takeoff should be based on the data.

PI.16.3 - Amended text to include instructions for use of the V1(MCG) field length temperature corrections.

Chapter NNC - Evacuation Checklist

Section Back Cover - Evacuation Checklist

Back Cover.2 - Removed amplifying information for Boeing cross-model standardization.

Intentionally
Blank

Page	Date
Volume 1	
* Title Page	June 9, 2006
* Copyright	June 9, 2006
0.0.1	March 29, 2004
0.0.2	March 28, 2005
0.1.1-2	December 2, 2005
0.2.1	March 29, 2004
0.2.2	December 2, 2005
0.2.3-4	March 29, 2004
0.2.5	March 31, 2003
0.2.6	July 28, 2000
0.3.1-3	March 29, 2004
0.3.4-6	December 2, 2005
* 0.4.1-10	June 9, 2006
* 0.4.11-12	Deleted
* 0.5.1-12	June 9, 2006
Bulletins (tab)	
0.6.1	December 2, 2005
* 0.6.2	June 9, 2006
Limitations (tab)	
* L.TOC.0.1-2	June 9, 2006
L.10.1	December 2, 2005
L.10.2	March 28, 2005
* L.10.3	June 9, 2006
L.10.4	December 2, 2005
* L.10.5-6	June 9, 2006

Page	Date
Normal Procedures (tab)	
* NP.TOC.0.1-2	June 9, 2006
NP.11.1	March 28, 2005
* NP.11.2-8	June 9, 2006
NP.21.1	March 28, 2005
* NP.21.2	June 9, 2006
NP.21.3	March 28, 2005
NP.21.4	December 2, 2005
NP.21.5-9	March 28, 2005
NP.21.10	December 2, 2005
NP.21.11-12	March 28, 2005
NP.21.13-39	December 2, 2005
* NP.21.40-41	June 9, 2006
NP.21.42	December 2, 2005
* NP.21.43	June 9, 2006
NP.21.44-48	December 2, 2005
* NP.21.49-52	June 9, 2006
Supplementary Procedures (tab)	
* SP.TOC.0.1-6	June 9, 2006
SP.05.1	September 26, 2003
SP.05.2	July 28, 2000
SP.1.1-6	December 2, 2005
SP.2.1	July 28, 2000
SP.2.2	March 29, 2004
* SP.2.3-8	June 9, 2006
SP.3.1-3	March 28, 2005
SP.3.4	December 2, 2005
SP.4.1	March 15, 2002
SP.4.2	September 26, 2003

* = Revised, Added, or Deleted

Page	Date
Supplementary Procedures (cont)	
SP.4.3-6	December 2, 2005
SP.5.1-2	July 28, 2000
* SP.6.1-4	June 9, 2006
* SP.7.1-5	June 9, 2006
SP.7.6	July 28, 2000
SP.8.1-2	July 28, 2000
SP.9.1-4	March 29, 2004
* SP.10.1	June 9, 2006
SP.10.2	September 27, 2004
SP.10.3-4	March 29, 2004
SP.11.1	March 28, 2005
SP.11.2-3	September 26, 2003
SP.11.4	December 2, 2005
SP.11.5-14	March 28, 2005
* SP.11.15	June 9, 2006
SP.11.16-21	March 28, 2005
SP.11.22	March 29, 2004
SP.12.1	March 31, 2003
SP.12.2-4	July 28, 2000
SP.16.1-18	December 2, 2005
Performance - Dispatch (tab)	
* PD.TOC.0.1-2	June 9, 2006
PD.10.1-6	March 15, 2002
PD.10.7	September 27, 2004
PD.10.8	September 26, 2003
PD.11.1	March 29, 2004
PD.11.2-5	March 15, 2002
PD.11.6	March 29, 2004
* PD.11.7	June 9, 2006
PD.11.8-9	September 27, 2004

Page	Date
Performance - Dispatch (cont)	
PD.11.10	March 15, 2002
PD.12.1	September 27, 2004
* PD.12.2	June 9, 2006
PD.12.3	September 27, 2004
* PD.12.4-8	June 9, 2006
* PD.13.1	June 9, 2006
PD.13.2-4	March 29, 2004
* PD.13.5-6	June 9, 2006
(blank tab)	

* = Revised, Added, or Deleted

Page	Date
Volume 2	
1 Airplane General, Emergency Equipment, Doors, Windows (tab)	
1.TOC.0.1-4	March 28, 2005
1.10.1	May 15, 2001
1.10.2	September 27, 2004
1.20.1-13	March 29, 2004
1.20.14	March 28, 2005
1.20.15-16	March 29, 2004
1.30.1-4	March 29, 2004
1.30.5	July 28, 2000
1.30.6	May 15, 2001
1.30.7-22	March 28, 2005
1.40.1-3	March 15, 2002
1.40.4-5	March 28, 2005
* 1.40.6	June 9, 2006
1.40.7	December 2, 2005
1.40.8-28	March 28, 2005
1.40.29	December 2, 2005
1.40.30-32	March 28, 2005

Page	Date
2 Air Systems (tab)	
2.TOC.0.1-2	September 26, 2003
2.10.1	May 24, 2002
2.10.2	March 31, 2003
2.10.3-8	May 24, 2002
2.20.1-2	May 15, 2001
2.20.3-4	July 28, 2000
2.30.1-6	July 28, 2000
2.40.1-2	July 28, 2000
2.40.3	May 15, 2001
2.40.4-5	March 31, 2003
2.40.6-8	September 26, 2003
3 Anti-Ice, Rain (tab)	
3.TOC.0.1-2	October 15, 2001
* 3.10.1	June 9, 2006
3.10.2-6	July 28, 2000
3.20.1	July 28, 2000
3.20.2	March 15, 2002
3.20.3-4	September 27, 2004
3.20.5	July 28, 2000
3.20.6	March 31, 2003
3.20.7	September 26, 2003
3.20.8	July 28, 2000
4 Automatic Flight (tab)	
* 4.TOC.0.1-2	June 9, 2006
4.10.1-2	March 28, 2005
4.10.3	October 31, 2002
4.10.4	March 29, 2004
4.10.5	March 28, 2005
4.10.6	December 2, 2005
4.10.7-9	October 31, 2002

* = Revised, Added, or Deleted

Page	Date
4 Automatic Flight (cont)	
4.10.10-11	March 28, 2005
4.10.12-13	October 31, 2002
4.10.14	September 26, 2003
4.10.15	March 28, 2005
4.10.16-18	October 31, 2002
4.10.19-21	September 26, 2003
4.10.22	September 27, 2004
4.10.23	March 28, 2005
4.10.24-26	September 27, 2004
4.20.1	May 15, 2001
* 4.20.2-10	June 9, 2006
4.20.11	March 28, 2005
* 4.20.12	June 9, 2006
4.20.13	September 26, 2003
4.20.14	September 27, 2004
4.20.15	September 26, 2003
4.20.16-17	March 28, 2005
4.20.18-22	September 26, 2003
5 Communications (tab)	
5.TOC.0.1-2	December 2, 2005
5.10.1	December 2, 2005
5.10.2-3	March 28, 2005
5.10.4-5	December 2, 2005
5.10.6-14	March 28, 2005
5.20.1-4	July 28, 2000
5.20.5-6	December 2, 2005
6 Electrical (tab)	
6.TOC.0.1-2	October 31, 2002
6.10.1	March 15, 2002
6.10.2	March 28, 2005

Page	Date
6 Electrical (cont)	
6.10.3	March 15, 2002
6.10.4	March 28, 2005
6.10.5	September 26, 2003
* 6.10.6	June 9, 2006
6.10.7	March 15, 2002
6.10.8	September 27, 2004
6.10.9-12	March 15, 2002
6.20.1-3	July 28, 2000
6.20.4	March 28, 2005
6.20.5	July 28, 2000
6.20.6-7	October 31, 2002
6.20.8	March 15, 2002
6.20.9-10	July 28, 2000
6.20.11-12	March 15, 2002
6.20.13	July 28, 2000
6.20.14-16	December 2, 2005
6.20.17	March 29, 2004
6.20.18	July 28, 2000
7 Engines, APU (tab)	
7.TOC.0.1-2	March 28, 2005
7.11.1	July 28, 2000
* 7.11.2	June 9, 2006
7.11.3	July 28, 2000
7.11.4	December 2, 2005
7.11.5	July 28, 2000
7.11.6-8	March 28, 2005
7.11.9-10	July 28, 2000
7.11.11	March 28, 2005
7.11.12-14	July 28, 2000
7.11.15-16	March 29, 2004

* = Revised, Added, or Deleted

Page	Date
7 Engines, APU (cont)	
7.15.1	July 28, 2000
7.15.2-5	September 26, 2003
7.15.6-8	May 15, 2001
7.20.1-2	September 26, 2003
7.20.3	September 27, 2004
7.20.4	September 26, 2003
7.20.5-7	July 28, 2000
7.20.8	March 28, 2005
7.20.9-14	July 28, 2000
7.30.1	July 28, 2000
7.30.2-3	December 2, 2005
7.30.4	March 28, 2005
8 Fire Protection (tab)	
8.TOC.0.1-2	March 28, 2005
8.10.1-4	July 28, 2000
8.10.5-6	March 28, 2005
8.10.7	May 24, 2002
8.10.8	May 15, 2001
8.20.1-5	July 28, 2000
8.20.6-8	March 28, 2005
9 Flight Controls (tab)	
9.TOC.0.1-2	December 2, 2005
9.10.1-16	December 2, 2005
9.20.1-6	July 28, 2000
9.20.7	May 15, 2001
9.20.8	March 31, 2003
9.20.9	May 15, 2001
9.20.10	March 31, 2003
9.20.11	December 2, 2005
9.20.12-13	March 29, 2004

Page	Date
9 Flight Controls (cont)	
9.20.14-15	December 2, 2005
9.20.16-18	March 29, 2004
9.20.19	March 28, 2005
9.20.20-24	March 29, 2004
10 Flight Instruments, Displays (tab)	
* 10.TOC.0.1-6	June 9, 2006
10.11.1-8	March 29, 2004
* 10.11.9-46	June 9, 2006
10.16.1	May 15, 2001
10.16.2-3	July 28, 2000
10.16.4-9	March 29, 2004
10.16.10-11	March 28, 2005
10.16.12	October 31, 2002
10.16.13	March 28, 2005
10.16.14-21	March 29, 2004
10.16.22-23	March 28, 2005
10.16.24	March 29, 2004
10.21.1	July 28, 2000
10.21.2	March 29, 2004
10.21.3-12	July 28, 2000
10.21.13	March 28, 2005
10.21.14-15	December 2, 2005
* 10.21.16	June 9, 2006
10.31.1-2	March 28, 2005
10.31.3	May 15, 2001
10.31.4	March 28, 2005
10.41.1	July 28, 2000
10.41.2-10	March 28, 2005
* 10.41.11	June 9, 2006
10.41.12-13	March 28, 2005

* = Revised, Added, or Deleted

Page	Date
10 Flight Instruments, Displays (cont)	
* 10.41.14-15	June 9, 2006
10.41.16	March 28, 2005
11 Flight Management, Navigation (tab)	
* 11.TOC.0.1-6	June 9, 2006
11.10.1-4	March 28, 2005
11.10.5-6	December 2, 2005
11.10.7-14	March 28, 2005
* 11.10.15-20	June 9, 2006
11.20.1-2	October 15, 2001
11.20.3-4	July 28, 2000
11.20.5	October 15, 2001
11.20.6	March 28, 2005
11.20.7-8	March 31, 2003
11.20.9-10	March 28, 2005
11.30.1	July 28, 2000
11.30.2	March 28, 2005
11.31.1-11	March 29, 2004
11.31.12-13	September 27, 2004
11.31.14-18	March 29, 2004
11.31.19	September 27, 2004
11.31.20	December 2, 2005
11.31.21	March 28, 2005
* 11.31.22	June 9, 2006
11.31.23	March 29, 2004
11.31.24	March 28, 2005
11.31.25	March 29, 2004
11.31.26	March 28, 2005
11.31.27	March 29, 2004
11.31.28-29	March 28, 2005
11.31.30-32	September 27, 2004

Page	Date
11 Flight Management, Navigation (cont)	
11.32.1	July 28, 2000
11.32.2	December 2, 2005
11.32.3-4	March 15, 2002
11.32.5	March 28, 2005
11.32.6	July 28, 2000
11.40.1-14	March 29, 2004
11.40.15	March 28, 2005
11.40.16-25	March 29, 2004
11.40.26-27	March 28, 2005
11.40.28-38	March 29, 2004
11.40.39	December 2, 2005
11.40.40	March 28, 2005
11.41.1	March 29, 2004
* 11.41.2	June 9, 2006
11.41.3	March 29, 2004
11.41.4	September 27, 2004
11.41.5-11	March 29, 2004
* 11.41.12	June 9, 2006
11.41.13-19	March 29, 2004
11.41.20-21	September 27, 2004
11.41.22-24	March 29, 2004
11.41.25-26	December 2, 2005
11.41.27-28	March 29, 2004
11.42.1	March 29, 2004
11.42.2-9	September 27, 2004
11.42.10-14	March 28, 2005
* 11.42.15-44	June 9, 2006
11.43.1	March 29, 2004
11.43.2	March 28, 2005

* = Revised, Added, or Deleted

Page	Date
11 Flight Management, Navigation (cont)	
11.43.3	September 27, 2004
11.43.4-28	December 2, 2005
11.60.1	March 29, 2004
11.60.2-4	September 27, 2004
11.60.5-9	March 28, 2005
* 11.60.10	June 9, 2006
11.60.11-13	September 27, 2004
11.60.14	March 28, 2005
11.60.15	September 27, 2004
11.60.16-17	March 28, 2005
11.60.18	September 27, 2004
12 Fuel (tab)	
12.TOC.0.1-2	March 29, 2004
12.10.1	July 28, 2000
12.10.2	March 28, 2005
12.10.3	December 2, 2005
12.10.4-5	September 27, 2004
12.10.6	March 28, 2005
12.10.7-10	March 29, 2004
12.20.1	March 29, 2004
12.20.2	March 28, 2005
12.20.3	March 15, 2002
12.20.4	July 28, 2000

Page	Date
13 Hydraulics (tab)	
13.TOC.0.1-2	October 31, 2002
13.10.1	July 28, 2000
13.10.2	September 26, 2003
* 13.10.3-5	June 9, 2006
13.10.6	December 2, 2005
13.20.1	July 28, 2000
13.20.2	May 24, 2002
13.20.3	July 28, 2000
13.20.4-7	December 2, 2005
13.20.8	October 31, 2002
14 Landing Gear (tab)	
14.TOC.0.1-2	December 2, 2005
14.10.1-5	July 28, 2000
14.10.6-8	March 15, 2002
14.20.1	July 28, 2000
14.20.2-3	October 15, 2001
14.20.4-8	December 2, 2005
15 Warning Systems (tab)	
* 15.TOC.0.1-2	June 9, 2006
15.10.1	July 28, 2000
15.10.2-10	September 26, 2003
15.20.1	October 15, 2001
15.20.2	September 27, 2004
15.20.3	December 2, 2005
15.20.4	May 24, 2002
* 15.20.5-12	June 9, 2006
15.20.13-14	September 26, 2003
15.20.15	March 28, 2005
15.20.16-18	September 26, 2003
(blank tab)	

* = Revised, Added, or Deleted

Page	Date
Quick Reference Handbook	
Quick Action Index	
* QA.Index.1-2	June 9, 2006
Annunciated Index (tab)	
* ANN.Index.1-4	June 9, 2006
Normal Checklists	
* NC.1-4	June 9, 2006
Checklist Introduction (tab)	
CI.TOC.0.1-2	March 28, 2005
CI.1.1-2	March 28, 2005
CI.2.1	December 2, 2005
* CI.2.2-6	June 9, 2006
Non-Normal Checklists (tab)	
0 Unannunciated Checklists (tab)	
* TOC.0.1-2	June 9, 2006
0.1-7	March 28, 2005
* 0.8	June 9, 2006
0.9-11	March 28, 2005
0.12-14	December 2, 2005
0.15	March 28, 2005
* 0.16	June 9, 2006
0.17	December 2, 2005
0.18-20	March 28, 2005
0.21-24	December 2, 2005
* 0.25	June 9, 2006
0.26-33	December 2, 2005
0.34	March 28, 2005
0.35	December 2, 2005
* 0.36-40	June 9, 2006

Page	Date
1 Airplane General, Emergency Equipment, Doors, Windows (tab)	
TOC.1.1-2	December 2, 2005
1.1	March 28, 2005
1.2-4	December 2, 2005
* 1.5-7	June 9, 2006
1.8	March 28, 2005
2 Air Systems (tab)	
TOC.2.1-2	March 28, 2005
2.1-2	December 2, 2005
2.3	March 28, 2005
* 2.4	June 9, 2006
2.5	March 28, 2005
2.6-9	December 2, 2005
2.10	March 28, 2005
3 Anti-Ice, Rain (tab)	
TOC.3.1-2	March 28, 2005
3.1	December 2, 2005
3.2-4	March 28, 2005
4 Automatic Flight (tab)	
TOC.4.1-2	March 28, 2005
4.1-2	March 28, 2005
5 Communications, Datalink (tab)	
TOC.5.1-2	March 28, 2005
* 5.1	June 9, 2006
5.2	March 28, 2005

* = Revised, Added, or Deleted

Page	Date
6 Electrical (tab)	
TOC.6.1-2	March 28, 2005
6.1	March 28, 2005
6.2-3	December 2, 2005
6.4	March 28, 2005
6.5	December 2, 2005
6.6	March 28, 2005
7 Engines, APU (tab)	
TOC.7.1-2	December 2, 2005
7.1	March 28, 2005
7.2-3	December 2, 2005
* 7.4	June 9, 2006
7.5-6	December 2, 2005
* 7.7	June 9, 2006
7.8	December 2, 2005
7.9-11	March 28, 2005
* 7.12	June 9, 2006
7.13	December 2, 2005
7.14-15	March 28, 2005
* 7.16	June 9, 2006
7.17	March 28, 2005
7.18-20	December 2, 2005
7.21-26	March 28, 2005
7.27	December 2, 2005
7.28	March 28, 2005

Page	Date
8 Fire Protection (tab)	
TOC.8.1-2	December 2, 2005
8.1-2	December 2, 2005
8.3	March 28, 2005
8.4-6	December 2, 2005
* 8.7	June 9, 2006
8.8	December 2, 2005
* 8.9	June 9, 2006
8.10-12	December 2, 2005
9 Flight Controls (tab)	
TOC.9.1-2	December 2, 2005
9.1-2	March 28, 2005
9.3-4	December 2, 2005
9.5	March 28, 2005
9.6-28	December 2, 2005
10 Flight Instruments, Display (tab)	
TOC.10.1-2	December 2, 2005
10.1	March 28, 2005
10.2-4	December 2, 2005
11 Flight Management, Navigation (tab)	
TOC.11.1-2	March 28, 2005
11.1	March 28, 2005
11.2-3	December 2, 2005
11.4	March 28, 2005

* = Revised, Added, or Deleted

Page	Date
12 Fuel (tab)	
TOC.12.1-2	December 2, 2005
* 12.1	June 9, 2006
12.2-3	March 28, 2005
* 12.4	June 9, 2006
12.5-7	December 2, 2005
12.8	March 28, 2005
12.9	December 2, 2005
12.10	March 28, 2005
13 Hydraulics (tab)	
TOC.13.1-2	March 28, 2005
13.1-3	March 28, 2005
13.4-5	December 2, 2005
13.6-7	March 28, 2005
* 13.8-9	June 9, 2006
13.10-12	March 28, 2005
14 Landing Gear (tab)	
TOC.14.1-2	December 2, 2005
14.1	December 2, 2005
* 14.2	June 9, 2006
14.3	December 2, 2005
14.4-6	March 28, 2005
14.7	December 2, 2005
14.8	March 28, 2005
15 Warning Systems (tab)	
* TOC.15.1-2	June 9, 2006
* 15.1-2	June 9, 2006

Page	Date
Maneuvers (tab)	
MAN.TOC.0.1-2	December 2, 2005
MAN.1.1-5	March 28, 2005
MAN.1.6	December 2, 2005
MAN.1.7-8	March 28, 2005
* MAN.1.9	June 9, 2006
MAN.1.10-14	March 28, 2005
* MAN.2.1-2	June 9, 2006
MAN.2.3-8	December 2, 2005
Performance - Inflight (tab)	
* PI.TOC.0.1-4	June 9, 2006
* PI.10.1-38	June 9, 2006
PI.11.1	March 29, 2004
PI.11.2-6	March 15, 2002
PI.11.7	March 31, 2003
PI.11.8	March 15, 2002
PI.12.1	December 2, 2005
PI.12.2	September 27, 2004
PI.12.3	December 2, 2005
PI.12.4	March 28, 2005
PI.12.5	September 27, 2004
PI.12.6	March 28, 2005
PI.12.7	September 27, 2004
PI.12.8	March 28, 2005
PI.12.9	September 27, 2004
PI.12.10	March 28, 2005
PI.12.11-14	September 27, 2004
PI.13.1-5	March 31, 2003
PI.13.6	March 15, 2002
PI.13.7	March 29, 2004
* PI.13.8	June 9, 2006

* = Revised, Added, or Deleted

Page	Date
Performance - Inflight (cont)	
PI.13.9-10	September 26, 2003
* PI.13.11-12	June 9, 2006
PI.14.1	September 27, 2004
PI.14.2-6	March 31, 2003
PI.15.1-4	March 31, 2003
PI.16.1	October 31, 2002
PI.16.2	March 31, 2003
* PI.16.3	June 9, 2006
PI.16.4-12	September 27, 2004
Index (tab)	
* NNC.Index.1-6	June 9, 2006
Evacuation Checklist (tab)	
* Back Cover.1-2	June 9, 2006

* = Revised, Added, or Deleted

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General

The Boeing Company issues Flight Crew Operations Manual (FCOM) bulletins as required. Bulletins transmit temporary information which must be issued before the next formal revision to the FCOM or information of interest to all operators.

Bulletins are numbered sequentially for each operator. Each new bulletin is recorded in this record when received and filed as instructed. A bulletin may not apply to all airplane models. Each bulletin specifically identifies the airplane effectivity. When appropriate, the next formal FCOM revision will include an updated bulletin record page.

Temporary information is normally incorporated into the manual at the next formal revision. When the condition remains temporary after a bulletin incorporation, the temporary paragraphs are identified by a heading referencing the originating bulletin. When the temporary condition no longer exists, the bulletin is cancelled and the original manual content is restored.

Bulletin status is defined as follows:

- In Effect (IE) - the bulletin contains pertinent information not otherwise covered in the FCOM. The bulletin is active and should be retained in the manual.
- Incorporated (INC) - the bulletin operating information has been incorporated into the FCOM. The bulletin is active and should be retained in the manual.
- Cancelled (CANC) - the bulletin is no longer in active and should be removed from the FCOM. Previously cancelled bulletins are no longer listed in the Bulletin Record.

The record below should be accomplished by the person revising the material.

Number	Subject	Date	Status
EZY-1R1	AFDS Performance Degradation with Radio Altimeter Failure	Jun 30, 2004	IE
EZY-2R1	GPWS Minimums Voice Callout Anomaly	Jun 30, 2004	IE
EZY-3R1	Look-Ahead Terrain Alerting Display Anomalies	Jun 30, 2004	IE
EZY-9R1	Inflight Start EGT Display	Jun 30, 2004	IE
EZY-16R1	Integrated Standby Flight Display (ISFD) Alignment Anomaly	Jul 14, 2004	IE

Number	Subject	Date	Status
EZY-17R3	AD 2002-19-52 and AD 2002-24-51, Center Tank Fuel Pumps	Jul 7, 2003	IE
EZY-18	AD-2002-19-51, Flight Control Modules	Sep 16, 2002	IE
EZY-22R1	Flight Director and Autopilot Mode Entry Failures	Nov 1, 2004	IE
EZY-23R1	Autopilot Altitude Acquire/Altitude Capture Anomaly	Nov 1, 2004	IE
EZY-25R1	Target Speed Anomaly with Flaps Extended and VNAV Engaged	Nov 1, 2004	IE
EZY-26R1	Flight Director Anomaly	Oct 21, 2005	IE
EZY-27	Predictive Windshear system Anomaly	Jan 19, 2004	IE
EZY-29	Center Tank Fuel System Changes	Jun 4, 2004	IE
EZY-30R1	Nuisance Stall Warning Stick Shaker Events	Apr 15, 2004	IE

Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-1 R1

Date: June 30, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: AFDS Performance Degradation with Radio Altimeter Failure

Reason: To inform flight crews of potential AFDS performance degradation associated with certain Radio Altimeter failure modes. The purpose of this reissue is to provide Service Bulletin information.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

The LNAV function of the flight management computer (FMC) is limited to a bank angle limit of 30 degrees by the flight control computers (FCC) when the radio altitude is 400 feet or greater. Below 200 feet, LNAV is limited to 8 degrees of bank angle. Between 200 and 400 feet bank angle is limited to 15 degrees. The actual bank angle commanded by the FMC will be within these bounds.

Flight testing has confirmed that certain radio altimeter failure modes can cause degraded autopilot flight director system (AFDS) performance. These failure modes may not cause an amber RA failure flag to be displayed.

If a radio altimeter fails while transmitting a valid altitude of less than 200 feet or if the radio altimeter output never becomes valid after power up on the ground, the associated FCC, which uses that radio altimeter as its primary source of data, will use the last valid altitude received or use zero feet if no valid altitude is received after power-up. This will result in the LNAV command on that side always being limited to 8 degrees of bank angle, during either autopilot or flight director operation. Depending on the aggressiveness of the programmed turns of

the active LNAV path, this failure could result in the airplane departing the LNAV path if the FMC desired commands exceed the AFDS bank limits.
This failure will be indicated by the airplane symbol not following the defined (magenta) path as shown on the Navigation Display.

Operating Instructions

Boeing procedures emphasize the need for pilot monitoring of automated systems to ensure acceptable performance in flight. In this case, vigilant flight path monitoring will reveal the radio altimeter failure as a deviation from the FMC computed path when using LNAV guidance. This failure will also cause a flight director disagreement in LNAV mode. The flight director associated with the failed radio altimeter will be limited to 8 degrees of bank. The flight director associated with the operating radio altimeter will not be bank angle limited unless the airplane is below 400 feet AGL. If these effects occur, the flight crew must utilize other appropriate methods of flight path control at their disposal. These methods include but are not limited to: use of manual flight modes to keep the airplane on the FMC path or use of VOR guidance to track appropriate radials if the LNAV track overlays VOR airway structure. Additionally, the autopilot and flight director LNAV steering commands will be normal from the FCC associated with a functioning radio altimeter.

Administrative Information

This bulletin replaces bulletin EZY-1, dated July 29, 2000. Discard bulletin EZY-1. Revise the Bulletin Record to show EZY-1 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-1 R1 "IN EFFECT" (IE)

This anomaly is corrected by Boeing Service Bulletin 737-SL-22-044. This FCOM Bulletin will be canceled after Boeing is notified that all affected airplanes in the operator's fleet have been modified.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

Mailing Address:	Manager 737, Flight Technical Integration & Data Boeing Commercial Airplane Group P. O. Box 3707 MS 20-89 Seattle, WA 98124-2207 USA
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Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-2 R1

Date: June 30, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: GPWS Minimums Voice Callout Anomaly

Reason: To inform flight crews of an anomaly in the DH/MDA voice callout functionality. The purpose of this reissue is to provide Service Bulletin information.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

The DH/MDA Callouts do not always function correctly on airplanes equipped with Look Ahead Terrain Alerting (GPWS). If the Minimums Reference Selector (MINS) on the EFIS Control Panel is rotated from BARO to RADIO below 1000 feet AGL, the callout may occur immediately and not at the appropriate altitude. This does not occur when the switch is rotated above 1000 feet AGL.

The Landing Altitude/Minimums Indications on the PFD display function correctly. These include the BARO Minimums Pointer and the Minimums Reference/Altitude.

Operating Instructions

Do not rotate the Minimums Reference Selector (MINS) on the EFIS Control Panel from BARO to RADIO once the airplane has descended below 1000 feet AGL.

Administrative Information

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-2 R1 "IN EFFECT" (IE)

This bulletin replaces bulletin EZY-2, dated July 29, 2000. Discard bulletin EZY-2. Revise the Bulletin Record to show EZY-2 as "CANCELLED" (CANC).

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by Service Bulletin 737-34-1616. If you do not plan to modify all your airplanes and would like to have the contents of this bulletin incorporated in your FCOM, please advise Boeing accordingly.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

Mailing Address:	Manager 737, Flight Technical Integration & Data Boeing Commercial Airplane Group P. O. Box 3707 MS 20-89 Seattle, WA 98124-2207 USA
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Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-3 R1

Date: June 30, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Look-Ahead Terrain Alerting Display Anomalies

Reason: To inform flight crews of display anomalies associated with GPWS look-ahead terrain alerting. The purpose of this reissue is to provide Service Bulletin information.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

During a GPWS look-ahead terrain CAUTION or WARNING, terrain display data may be positioned inaccurately on the navigation display.

At ranges of 40 NM or greater, solid amber or solid red terrain data displays at an erroneous distance ahead of the airplane symbol. The error increases as the range selection is increased and can be up to 20 NM at the 160 NM range setting. Dotted red, dotted amber, and dotted green terrain data display correctly. Only solid amber (look-ahead terrain CAUTION active) and solid red terrain (look-ahead terrain WARNING active) data displays are affected.

In addition, display of solid amber and solid red terrain data may be delayed by 2 or 3 display sweeps after the initial terrain alert. Once displayed, solid terrain data may be removed on a subsequent display sweep.

Operating Instructions

The terrain data display is intended to serve as a situational awareness tool only. It does not provide the accuracy or fidelity on which to solely base terrain avoidance maneuvering decisions.

In the event of a look-ahead terrain CAUTION or WARNING, accomplish the appropriate Terrain Avoidance maneuver in the Non-Normal Maneuvers chapter of the QRH.

Administrative Information

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-3 R1 "IN EFFECT" (IE).

This bulletin replaces bulletin EZY-3, dated July 29, 2000. Discard bulletin EZY-3. Revise the Bulletin Record to show EZY-3 as "CANCELLED" (CANC).

This anomaly is corrected by Boeing Service Bulletin 737-34-1616. This FCOM Bulletin will be canceled after Boeing is notified that all affected airplanes in the operator's fleet have been modified.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
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737

Number: EZY-9 R1

Date: June 30, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Inflight Start EGT Display

Reason: To inform flight crews that the inflight start EGT start limit and exceedance indications may not appear correctly below 20,000 feet. The purpose of this reissue is to provide Service Bulletin information.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Exhaust Gas Temperature (EGT) is normally displayed on the center instrument panel upper display unit (DU) as both a digital readout and a round dial/moving pointer indication. Maximum operating limits are indicated by redlines.

The EGT Start Limit redline is displayed during engine start when N2 is less than idle. If an exceedance is noted by the electronic engine control (EEC), the digital readout, box, pointer and indicator change color to red.

Flight testing has shown that the Exhaust Gas Temperature (EGT) Start Limit redline and associated exceedance indications may not display during inflight engine starts below 20,000 feet due to an EEC software error. An EEC software update, due early first quarter 2002, will correct the anomaly.

Operating Instructions

Monitor EGT when performing the Inflight Engine Start procedure to ensure EGT does not rise rapidly or exceed the start limit of 725°C during the start attempt.

Administrative Information

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-9 R1 "IN EFFECT" (IE).

This bulletin replaces bulletin EZY-9, dated August 21, 2001. Discard bulletin EZY-9. Revise the Bulletin Record to show EZY-9 as "CANCELLED" (CANC).

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by CFM 56-7B Service Bulletin 73-0082.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
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737

Number: EZY-16 R1

Date: July 14, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Integrated Standby Flight Display (ISFD) Alignment Anomaly

Reason: To inform flight crews of an ISFD anomaly and provide corrective action. The purpose of this reissue is to provide Service Bulletin information.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has received reports of incorrect attitude on the Integrated Standby Flight Display (ISFD). Subsequent investigation has found that improper alignment of the ISFD can cause attitude display anomalies. The display anomaly shows after takeoff as an obvious error in pitch and/or roll.

The Integrated Standby Flight Display (ISFD) performs a two-minute alignment immediately after the Battery switch has been positioned ON. Any change in airplane position during this alignment period may result in inaccurate attitude information not annunciated to the flight crew. The anomaly is not detectable by ISFD internal monitoring and may not show an obvious error in roll and/or pitch indications when compared to the pilots' primary flight instruments during preflight. Gust effects or movement of cabin occupants during the ISFD alignment period will not cause the anomaly.

Re-alignment can only be accomplished by cycling electrical power to the ISFD while the airplane is on the ground. This can be accomplished by removing all airplane electrical power or by an approved maintenance procedure.

The RST switch on the ISFD does not correct for inaccuracies introduced by airplane movement during the alignment process. It should only be pushed in response to the ATT:RST amber message.

Operating Instructions

An airplane Flight Manual (AFM) Limitation will be published that states:

INTEGRATED STANDBY FLIGHT DISPLAY (IF INSTALLED)

The Flight Crew must verify the airplane was not moved during Integrated Standby Flight Display alignment. If unable to verify, then the power up alignment process must be reinitialized and completed prior to flight."

To comply with the AFM limitation, the airline must have procedures in place to assure flight crews on the first flight of the day, crew change, or after any complete airplane power down, that ISFD alignment was completed before the airplane was moved.

The following note will be added to the Flight Deck Safety Inspection – Captain or First Officer normal procedure:

Battery Switch
……..…….ON
Guard – Down
Note: Do not move the airplane until ISFD alignment is complete.

The following will be included in the Flight Deck Preparation – Captain normal procedure:

Integrated Standby Flight Display
…….....Check
Approach Mode Display – Blank
Set local altimeter setting
Verify flight instrument indications are correct
Verify no flags or messages are displayed.

Administrative Information

This bulletin replaces bulletin EZY-16, dated August 30, 2002. Discard bulletin EZY-16. Revise the Bulletin Record to show EZY-16 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-16 R1 "IN EFFECT" (IE).

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by Service Bulletin 737-34-1720.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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737

Number: EZY-17 R3

Date: July 07, 2003

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: AD 2002-19-52 and AD 2002-24-51, Center Tank Fuel Pumps

Reason: This is a reissue of EZY-17 R2, issued on November 25, 2002, that informed flight crews of the potential for fuel pump damage that could create a potential ignition source. This reissue provides procedures approved by the FAA per FAA Approval Letters 140S-02-376, 140S-02-363 and 140S-03-189 as an Alternative Method of Compliance.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Inspections of Hydro-Aire fuel pumps found evidence of a chafed stator lead wire bundle that may cause the wire to contact the rotor and produce arcing, thus creating a potential ignition source. Inspections of other damaged Hydro-Aire pumps found evidence of localized overheating of parts in the priming and vapor pump section of the fuel pump, possibly due to extended dry running.

Because of these findings, the FAA issued Airworthiness Directive (AD) 2002-19-52 in September 2002 and AD 2002-24-51 in November 2002 to require flight crews to maintain certain minimum fuel levels in the center fuel tanks when operating any Hydro-Aire fuel pump.

The Operating Instructions of this bulletin provide the procedures as required by the two ADs. In response to numerous requests from operators, however, Boeing has also developed procedures that will minimize dry running of the center tank fuel pumps, while reducing the potential for large quantities of fuel remaining in the center tank. These alternate procedures have been approved by the FAA per

Approval Letter 140S-03-189 for those airplanes in which the center tank fuel pumps have been inspected via an approved inspection process to ensure proper wire bundle positioning. These alternate procedures are described in the Alternate Operating Instructions section below. In addition, alternate procedures have been approved per Approval Letters 140S-02-376 and 140S-02-363 to provide relief during ground defueling and fuel transfer and are also presented below.

Per AD 2002-19-52, placards are to be installed on all airplanes with affected pumps installed in the center fuel tank. Once both center tank fuel pumps on an individual airplane have been inspected or replaced, the airplane placard may be removed and the Alternate Operating Instructions contained in this bulletin may be used.

Boeing is revising the Master Caution system logic to illuminate the Master Caution and the FUEL system annunciator lights when either center tank fuel pump experiences low pressure. This will provide a more direct indication of a single pump low pressure state and help minimize unintentional dry running of the center tank fuel pumps. In addition, Boeing is revising the control logic for the center tank fuel pumps to incorporate an automatic shutoff feature to further reduce dry running of the pumps. These updates will be available no later than first quarter 2004 via Boeing service bulletin.

The procedures described below in the Operating Instructions sections of this bulletin remain in effect until the Master Caution system logic change and the center tank fuel pump automatic shutoff feature are incorporated.

Operating Instructions (AD 2002-19-52 and AD 2002-24-51)

These procedures are essentially unchanged from those previously published in accordance with AD 2002-19-52 and AD 2002-24-51. Minor changes have been made for clarification.

NORMAL PROCEDURES

The center tank fuel quantity indication system must be operative to dispatch with fuel in the center fuel tank.

The center tank fuel pump switch(es) must be turned OFF at the first indication of fuel pump low pressure any time during the flight. This includes LOW PRESSURE indications that may occur because of pitch attitude changes.

Takeoff and Initial Climb

Both center tank fuel pump switches must be OFF for takeoff if center tank fuel is less than 5000 pounds (2300 kilograms) with the airplane readied for initial taxi. Both center tank fuel pumps should be repositioned ON above 10,000 feet or after the pitch attitude has been reduced to begin acceleration to a climb speed of 250 knots or greater, if more than 1000 pounds (500 kilograms) remain in the center tank.

Climb and Cruise

Both center tank fuel pump switches must be turned OFF during climb and cruise when the center tank fuel quantity reaches approximately 1000 pounds (500 kilograms). A center tank fuel pump switch must be turned OFF at the first indication of fuel pump low pressure any time during the flight. This includes low pressure indications that may occur as a result of pitch attitude changes.

Descent

Both center tank fuel pump switches must be turned OFF at the beginning of the descent if less than 3000 pounds (1400 kilograms) of fuel remain in the center tank. If an extended period of level flight is required prior to approach and landing, i.e., holding, the center tank fuel pump switch(es) may be re-positioned ON if more than 1000 pounds (500 kilograms) remain in the tank. The fuel pump must be turned OFF at the first indication of pump low pressure.

NON-NORMAL PROCEDURES

CONFIG Indication

The CONFIG indicator will annunciate if center tank fuel exceeds 1600 pounds (800 kilograms) and the center tank fuel pump switches are OFF or are producing low pressure. Do not accomplish the CONFIG non-normal procedure prior to or during takeoff with less than 5000 pounds (2300 kilograms) of fuel in the center tank. Do not accomplish the CONFIG non-normal procedure during descent and landing with less than 3000 pounds (1400 kilograms) of fuel in the center tank.

Pump Failure

If one center tank fuel pump fails with fuel in the center tank, position the failed pump OFF. Open the crossfeed valve to prevent a fuel imbalance. The remaining center tank fuel pump may remain ON until the center tank fuel quantity reaches approximately 1000 pounds (500 kilograms). The center tank fuel pump switch must be turned OFF at the first indication of fuel pump low pressure, i.e., Master Caution and FUEL system annunciator lights illuminated, any time during the flight.

NOTE: The fuel crossfeed valve must be closed for landing.

Fuel LOW Indication

In a low fuel non-normal situation, both center tank fuel pumps may be selected ON and all center tank fuel may be used regardless of the amount of fuel remaining in the tank.

ADDITIONAL INFORMATION

Fuel Loading

For the time period that AD 2002-19-52 and AD 2002-24-51 are in effect, the zero fuel gross weight of the airplane plus the weight of center tank fuel may exceed the maximum zero fuel gross weight by up to 5000 pounds (2300

kilograms) for takeoff, climb and cruise, and up to 3000 pounds (1400 kilograms) for descent and landing, provided the effects of balance (CG) have been considered.

Ground Procedures - Defueling and Fuel Transfer

When defueling center or main wing tanks, monitor the Fuel Pump Low Pressure indication lights and position fuel pumps OFF at the first indication of fuel pump low pressure. Defueling with passengers on board is prohibited.

NOTE: The following defueling and fuel transfer procedures may be used in lieu of the above per FAA Approval Letters 140S-02-376 and 140S-02-363.

Prior to transferring fuel or defueling, conduct a lamp test of the respective fuel pump LOW PRESSURE lights. When transferring fuel or defueling from either the center or main wing tanks, monitor the fuel pump LOW PRESSURE lights and turn the fuel pumps OFF at the first indication of fuel pump low pressure. Fuel may be transferred from tank to tank or the aircraft may be defueled with passengers on board, provided the fuel quantity in the tank from which fuel is being taken is maintained at not less than 2000 pounds (900 kilograms). Deplane all passengers and non-essential crew when defueling or transferring fuel from a tank that has a fuel quantity less than 2000 pounds (900 kilograms). Wait until the process has been completed and the respective fuel pumps turned OFF before reloading non-essential crew and passengers.

Operating Instructions (Alternate Operating Instructions)

These procedures have been approved by the FAA as a Alternative Method of Compliance (AMOC) to AD 2002-24-51 per FAA Approval Letter 140S-03-189. These procedures may be used in lieu of the original procedures for those airplanes in which the center tank fuel pumps have been inspected via an approved inspection process to ensure proper wire bundle positioning.

NORMAL PROCEDURES

The center tank fuel quantity indication system must be operative to dispatch with fuel in the center fuel tank.

The center tank fuel pump switch(es) must be turned OFF at the first indication of fuel pump low pressure any time during the flight. This includes LOW PRESSURE indications that may occur as a result of pitch attitude changes.

Takeoff and Initial Climb

Both center tank fuel pump switches must be OFF for takeoff if center tank fuel is less than 5000 pounds (2300 kilograms) with the airplane readied for initial taxi. Both center tank fuel pumps should be repositioned ON above 10,000 feet or after the pitch attitude has been reduced to begin acceleration to a climb speed of 250 knots or greater, if more than 2000 pounds (950 kilograms) remain in the center tank.

Climb and Cruise

Turn one center tank fuel pump switch OFF during climb or cruise when the center tank fuel quantity reaches approximately 2000 pounds (950 kilograms). Open the crossfeed valve to minimize fuel imbalance. When the Master Caution and FUEL system annunciator lights illuminate, turn the remaining center tank fuel pump switch OFF without delay and close the fuel crossfeed valve. The fuel crossfeed valve must be closed for landing.

Descent

Turn one center tank fuel pump switch OFF at the beginning of the descent if less than 3000 pounds (1400 kilograms) of fuel remain in the center tank. Open the crossfeed valve to minimize fuel imbalance. When the Master Caution and FUEL system annunciator lights illuminate, turn the remaining center tank fuel pump switch OFF without delay and close the fuel crossfeed valve. If an extended period of level flight is required prior to approach and landing, i.e., holding, and fuel remains in the center tank, a single center tank fuel pump switch may be re-positioned ON if both fuel pumps were previously turned OFF. The fuel crossfeed valve should be opened to prevent fuel imbalance. At the first indication of pump low pressure, the fuel pump must immediately be turned off and the fuel crossfeed valve must be closed. The fuel crossfeed valve must be closed for landing.

NON-NORMAL PROCEDURES

CONFIG Indication

The CONFIG indicator will annunciate if center tank fuel exceeds 1600 pounds (800 kilograms) and the center tank fuel pump switches are OFF or are producing low pressure. Do not accomplish the CONFIG non-normal procedure prior to or during takeoff with less than 5000 pounds (2300 kilograms) of fuel in the center tank. Do not accomplish the CONFIG non-normal procedure during descent and landing with less than 3000 pounds (1400 kilograms) of fuel in the center tank.

Pump Failure

If one center tank fuel pump fails with fuel in the center tank, turn the failed pump switch OFF. Turn the operational pump ON, if previously turned OFF. Open the fuel crossfeed valve to prevent a fuel imbalance. Turn the remaining center tank fuel pump switch OFF when the Master Caution and FUEL system annunciator lights illuminate and close the fuel crossfeed valve.

NOTE: The fuel crossfeed valve must be closed for landing.

Fuel LOW Indication

In a low fuel non-normal situation, both center tank fuel pumps may be selected ON and all center tank fuel may be used regardless of the amount of fuel remaining in the tank.

ADDITIONAL INFORMATION

Fuel Loading

For the time period that AD 2002-19-52 and AD 2002-24-51 are in effect, the zero fuel gross weight of the airplane plus the weight of center tank fuel may exceed the maximum zero fuel gross weight by up to 5000 pounds (2300 kilograms) for takeoff, climb and cruise, and up to 3000 pounds (1400 kilograms) for descent and landing, provided the effects of balance (CG) have been considered.

Ground Procedures - Defueling and Fuel Transfer

Prior to transferring fuel or defueling, conduct a lamp test of the respective fuel pump LOW PRESSURE lights. When transferring fuel or defueling from either the center or main wing tanks, monitor the fuel pump LOW PRESSURE lights and turn the fuel pumps OFF at the first indication of fuel pump low pressure. Fuel may be transferred from tank to tank or the aircraft may be defueled with passengers on board, provided the fuel quantity in the tank from which fuel is being taken is maintained at not less than 2000 pounds (900 kilograms). Deplane all passengers and non-essential crew when defueling or transferring fuel from a tank that has a fuel quantity less than 2000 pounds (900 kilograms). Wait until the process has been completed and the respective fuel pumps turned OFF before reloading non-essential crew and passengers.

Administrative Information

This bulletin replaces EZY-17 R2, dated November 25, 2002. Discard bulletin EZY-17 R2. Revise the Bulletin Record page to show EZY-17 R2 as “CANCELLED” (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-17 R3 "IN EFFECT" (IE)

This bulletin will be canceled after Boeing is notified that the Master Caution system logic change and the center tank fuel pump automatic shutoff feature are incorporated and the center tank fuel pumps have been inspected via an approved inspection process to ensure proper wire bundle positioning.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
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The Boeing Company
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737

Number: EZY-18

Date: September 16, 2002

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: AD-2002-19-51, Flight Control Modules

Reason: This bulletin informs flight crews of the potential for failure of a flight control module. This bulletin also provides operating instructions for flight crews.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Flight control module failures have been reported on 737-600/-700/-700C/-800/-900/BBJ airplanes since June 2002. The majority of the failures have occurred during preflight checks prior to delivery acceptance test flights, but failures have also been reported on four in-service airplanes. Discussions with the supplier indicate the potential for this condition is most likely isolated to Flight Control Module Part Number 65-44891-7, Serial Numbers 8726 through 8936, installed on airplanes delivered after May 21, 2002. The FAA has issued Emergency Telegraphic AD 2002-19-51 to address required operator action.

There are two identical flight control modules on each airplane. Each module controls hydraulic fluid distribution from its respective hydraulic system to the aileron, elevator and rudder. The failure mode is a partial or complete blockage in the return passage of the module resulting in inadequate differential pressure available to flight control power control actuators (ailerons, elevators, rudder). Failure of one flight control module in flight may result in an increase in flight control forces. Failure of a second flight control module could result in serious degradation of airplane controllability, including high control forces.

Because the blockage is in the return passage, the associated Flight Control LOW PRESSURE Light remains extinguished for the affected flight control module. The Hydraulic LOW PRESSURE Light also remains extinguished. The most likely flight deck indication is failure of both Autopilot A and B to engage. Other indications include possible increase in flight control forces (similar to manual reversion) and possible yaw damper disengagement.

Airplanes with two suspect modules are not to be flown until at least one non-suspect module has been installed.

In order to help identify a flight control module failure prior to flight, Boeing has developed Flight Control and Autopilot preflight checks to be performed on airplanes with a suspect flight control module installed. These checks can be performed anytime after the Electric Hydraulic Pump A and B Switches are positioned ON and prior to Engine Start. If MEL dispatch with one or both autopilot channels inoperative is planned, it is acceptable not to perform the Autopilot check on the inoperative channel(s).

If it is determined that a flight control module has failed, subsequent flights must not be made until the failed module has been removed and replaced.

Operating Instructions

Preflight Check:

The following Flight Control and Autopilot checks must be performed prior to each flight on an airplane with a suspect flight control module installed. These checks can be performed anytime after the Electric Hydraulic Pump A and B Switches are positioned ON and prior to Engine Start. Ensure ground personnel are clear of all control surfaces.

Note: These checks are only designed to detect a failed flight control module.

Flight Control Check

1. Ensure FLT CONTROL A & B Switches are ON
2. FLT CONTROL A Switch . . . . OFF
   - Verify Flight Control LOW PRESSURE Light illuminates within 2 seconds
3. FLT CONTROL A Switch . . . . ON
   - Verify Flight Control LOW PRESSURE Light extinguishes
4. FLT CONTROL B Switch . . . . OFF
   - Verify Flight Control LOW PRESSURE Light illuminates within 2 seconds
5. FLT CONTROL B Switch . . . . ON

Autopilot Check

If MEL dispatch with one or both autopilot channels inoperative is planned, it is acceptable not to perform the Autopilot check on the inoperative channel(s).

1. Ensure both IRUs are in the NAV Mode
2. A/P ENGAGE Switch . . . . CMD A
   - Wait 10 seconds and verify autopilot CMD mode engages
3. Disengage Autopilot A
4. A/P ENGAGE Switch . . . . CMD B
   - Wait 10 seconds and verify autopilot CMD mode engages
5. Disengage Autopilot B
6. To fail this test, one autopilot will fail to engage and the other will fail to remain engaged

Note: Failure of the autopilots to engage as described in Step 6 may indicate a failure of a flight control module.

Note: If either Flight Control Module Preflight Check fails, do not takeoff until the failed module has been replaced.

In-flight Failure

Failure of both Autopilot A and B to engage may indicate a failure of the module in flight. Other indications include possible increase in flight control forces (similar to manual reversion) and possible yaw damper disengagement.

Failure of a second flight control module in flight could result in serious degradation of airplane controllability, including high control forces.
If a failure is suspected in flight:

- Plan to land at the nearest suitable airport
  - Crosswind capability may be reduced
- Do not turn off any Flight Control Switches
- Plan a flaps 15 landing
- Use VREF 15 + 5 or VREF ICE + 5
- Place the GROUND PROXIMITY FLAP INHIBIT Switch to FLAP INHIBIT

Administrative Information

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-18 "IN EFFECT" (IE)

This bulletin will be cancelled after Boeing has been notified that no suspect flight control modules are installed in any airplanes in your fleet.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-22 R1

Date: November 01, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Flight Director and Autopilot Mode Entry Failures

Reason: This bulletin informs flight crews of flight director and autopilot anomalies that may be seen on airplanes equipped with the Collins Enhanced Digital Flight Control System (EDFCS). The purpose of this reissue is to provide Service Bulletin informaton.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has received reports of failure of the flight director (F/D) to enter takeoff mode and failure of the autopilot and flight director to enter pitch cruise modes on airplanes equipped with the Collins Enhanced Digital Flight Control System (EDFCS).

In certain scenarios, an error in the Collins FCC software may leave the glide slope engage logic set internally in either FCC without a corresponding G/S flight mode annunciation (FMA) on that side. This will cause the F/D takeoff mode and some autopilot or F/D pitch cruise modes to be inhibited.

This condition may also occur when an autopilot or F/D approach is discontinued using means other than autopilot or F/D go-around.

This anomaly will be corrected in a future FCC software upgrade.

Operating Instructions

Prior to takeoff, turn both flight director (F/D) switches OFF. Cycle F/D A ON then OFF. Cycle F/D B ON then OFF. At the completion of these steps, resume normal AFDS operations. This procedure should be accomplished whether the F/Ds are used for takeoff or not.

If an ILS approach is exited after G/S capture by means other than using the TO/GA switch, turn the autopilot and both F/D switches OFF. Cycle F/D A ON then OFF. Cycle F/D B ON then OFF. At the completion of these steps, resume normal AFDS operations.

Administrative Information

This bulletin replaces bulletin EZY-22, dated April 29, 2003. Discard bulletin EZY-22. Revise the Bulletin Record to show EZY-22 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-22 R1 "IN EFFECT" (IE).

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by Service Bulletin 737-22A1164. If you do not plan to modify all your airplanes and would like to have the contents of this bulletin incorporated in your FCOM, please advise Boeing accordingly.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
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The Boeing Company
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737

Number: EZY-23 R1

Date: November 01, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Autopilot Altitude Acquire/Altitude Capture Anomaly

Reason: This bulletin informs flight crews of an anomaly reported in the Collins Enhanced Digital Flight Control System (EDFCS). The purpose of this reissue is to provide Service Bulletin information.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has received a report of excessive pitch up and speed loss on an airplane equipped with the Collins Enhanced Digital Flight Control System (EDFCS) after selection of a new MCP altitude during an autopilot Altitude Acquire (ALT ACQ) maneuver.

Normally, if a new altitude is selected while in ALT ACQ, the Flight Control Computer (FCC) will automatically transition to vertical speed (V/S), synchronizing to the existing airplane vertical speed. If the selection is made after transition to Altitude Hold (ALT HLD), the FCC will remain in ALT HLD at the previously selected altitude.

It has been determined that if a new altitude selection is made when the FCC is in the final transition between ALT ACQ and ALT HLD (within a 200 msec window), an altitude somewhere between the previously selected MCP altitude and the new MCP altitude will be stored as the reference ALT HLD altitude. The FCC will command a pitch maneuver in the direction of this new altitude. This new pitch command may be excessive and if the autopilot is engaged, may require flight crew intervention to return the airplane to a normal flight path.

This anomaly will be corrected in a future FCC software upgrade.

Operating Instructions

If the MCP altitude is adjusted during ALT ACQ or when ALT HLD is first displayed, monitor autopilot and flight director commands. The autopilot or flight director should transition to V/S or continue to level in ALT HLD at the previously selected altitude. If autopilot or flight director pitch commands are excessive, ensure proper flight path control and select a new pitch mode if required.

Administrative Information

This bulletin replaces bulletin EZY-23, dated Jun 09, 2003. Discard bulletin EZY-23. Revise the Bulletin Record to show EZY-23 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-23 R1 "IN EFFECT" (IE).

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by Service Bulletin 737-22A1164. If you do not plan to modify all your airplanes and would like to have the contents of this bulletin incorporated in your FCOM, please advise Boeing accordingly.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
for
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The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-25 R1

Date: November 01, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Target Speed Anomaly with Flaps Extended and VNAV Engaged

Reason: This bulletin informs flight crews of target speed anomalies on airplanes equipped with the Collins Enhanced Digital Flight Control System (EDFCS) when flaps are extended and operating in VNAV. The purpose of this reissue is to provide Service Bulletin information.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has received reports of target speed anomalies with flaps extended when operating in VNAV during approach. The anomaly may occur at any flap setting from Flaps 2 to Flaps 40, but the discrepancy is most likely to occur at Flaps 15 due to system tolerances.

The Flight Management Computer (FMC) uses flap position data as output by the Flight Control Computer (FCC). Due to an implementation error in the Collins Enhanced Digital Flight Controls System (EDFCS), the FCC sends uncorrected flap position data rather than adjusted data. The FMC switches to the next higher flap setting when it receives a signal that the flap position has increased more than 0.5 degrees above the selected flap detent. With the flap handle at Flaps 15, the uncorrected flap position data may be as high as 19.5 degrees depending on airplane installation and tolerances. Similar differences between uncorrected and adjusted data exist for other flap settings, but the system tolerances are much smaller. As a result, the anomaly is less likely to occur at flap settings other than Flaps 15.

When Flaps 15 is selected, the target speed initially indicates the correct airspeed for the flap setting as the flaps transition from 10.5 to 15 degrees. If the tolerances at this flap setting result in an uncorrected output greater than 15.5 degrees, the target speed (magenta bug) may reduce to a speed consistent with Flaps 25 and the autothrottles will adjust to capture this lower speed. This results in the aircraft slowing to near minimum maneuver speed for Flaps 15.

When flying a VNAV approach on airplanes equipped with speed intervention (SPD INTV), the flight crew should select SPD INTV prior to the initial flap selection and manually set the correct flap speed on the MCP. The autothrottles will adjust to capture the MCP speed. SPD INTV should be used for the duration of the approach.

On airplanes without speed intervention, VNAV must be disengaged and the approach flown in another mode if the anomaly is observed. When landing flaps are selected, VNAV may be re-engaged.

On airplanes equipped with the Head-Up Display (HUD), the AOA approach band may not be correctly displayed with Flaps 15 selected. When Flaps 30 or 40 have been selected, the AOA approach band will be correctly displayed on the HUD.

This anomaly will be corrected in a future FCC software upgrade targeted for early 2004.

Operating Instructions

When flying VNAV approaches on airplanes equipped with speed intervention (SPD INTV), select SPD INTV prior to the initial flap selection and manually select the correct speed on the MCP. Remain in SPD INTV for the duration of the approach.

On airplanes without speed intervention, disengage VNAV and fly the approach in another mode if the anomaly is observed. When landing flaps are selected, VNAV may be re-engaged.

On airplanes equipped with HUD, if the AOA approach band is not correctly displayed at Flaps 15, do not use this information.

Administrative Information

This bulletin replaces bulletin EZY-25, dated Sep 30, 2003. Discard bulletin EZY-25. Revise the Bulletin Record to show EZY-25 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-25 R1 "IN EFFECT" (IE)

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by Service Bulletin 737-22A1164. If you do not plan to modify all your airplanes and would like to have the contents of this bulletin incorporated in your FCOM, please advise Boeing accordingly.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
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The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-26 R1

Date: October 21, 2005

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Flight Director Anomaly

Reason: This bulletin informs flight crews of a Flight Director anomaly during Flight Director Takeoffs on airplanes equipped with the Collins Enhanced Digital Flight Control System (EDFCS). The purpose of this reissue is to provide service letter information.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has discovered a flight director anomaly on airplanes equipped with the Collins Enhanced Digital Flight Control System (EDFCS). The anomaly may occur if the TO/GA switch is pressed a second time after liftoff while the flight director is already in takeoff mode. This anomaly only occurs during a flight director takeoff. Go-around mode is not affected, nor is operation with the autopilot engaged.

If LNAV has been selected prior to takeoff and a TO/GA switch has been pushed, pushing a TO/GA switch a second time after liftoff results in loss of flight director roll guidance and roll mode annunciation. Flight director roll guidance will be removed from view on those airplanes equipped with the split axis flight director and both pitch and roll flight director guidance will be removed from view on those airplanes equipped with the integrated cue flight director. This anomaly will occur anytime the airplane is in takeoff mode, regardless of altitude. LNAV or another roll mode can be re-selected anytime above 400 feet AGL and the correct flight director information will be displayed.

In addition, on those airplanes with the Heading Select-on-Takeoff option, pushing a TO/GA switch a second time while in Takeoff Heading Select mode above 400 feet AGL, will also result in loss of flight director roll guidance and roll mode annunciation. The flight director bar(s) will be removed from view. The correct flight director information will be displayed after re-selecting a roll mode.

This anomaly is present on all airplanes equipped with the Collins EDFCS, regardless of software load (i.e., P1.1 or P2.0). It will be corrected in a future FCC software upgrade targeted for first quarter 2005.

Operating Instructions

If roll mode annunciation and flight director guidance (roll, or pitch and roll) is lost following a second push of a TO/GA switch, reselect the appropriate roll mode when above 400 feet AGL.

Administrative Information

This bulletin replaces bulletin EZY-26, dated January 12, 2004. Discard bulletin EZY-26. Revise the Bulletin Record to show EZY-26 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-26 R1 "IN EFFECT" (IE).

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have been modified by Service Letter 737-SL-22-056-B. If you do not plan to modify all your airplanes and would like to have the contents of this bulletin incorporated in your FCOM, please advise Boeing accordingly.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-27

Date: January 19, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Predictive Windshear System Anomaly

Reason: This bulletin informs flight crews of the susceptibility of five airports to false Predictive Windshear System (PWS) alerts.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Airlines have reported false Predictive Windshear System (PWS) alerts at a number of airports. The anomaly is only applicable to PWS alerts; all Reactive Windshear alerts must be considered valid. These false alerts are limited to airplanes equipped with the Honeywell weather radar with PWS.

Honeywell has reviewed data provided by the affected airlines and has attempted to determine if particular airports and runways may be susceptible to "false alerts." In addition, data have been analyzed to determine if the alerts are more likely during takeoff or on approach.

At this time, Honeywell has accumulated sufficient data to suggest that the following airport/runway combinations are susceptible to false PWS alerts:

- LFMN (Nice), Runway 4L, Approach (27 events)
- LGSR (Santorini), Runway 34R, Approach (3 events)
- GCRR (Lanzerote), Runway 3, Approach (5 events)
- EHAM (Amsterdam), Runway 9, Takeoff (9 events)
- LEBL (Barcelona), Runway 25, Approach (4 events).

Although these particular airports appear to be more susceptible to false alerts, the data indicates the majority of operations at these airports do not experience false PWS alerts.

Flight crews should use the following criteria to help determine if windshear exists:

- reports of windshear from other aircraft
- visual indications
- tower windshear alerts
- differences between computed winds in the airplane and reported winds from the tower.

Honeywell continues to develop a software solution and will continue to process data in order to provide the most effective solution possible.

Operating Instructions

If a windshear alert is received, the flight crew should accomplish the Windshear Non-Normal Maneuver.

It is recommended operators establish policies for flight crews operating into one of the suspect airport/runway combinations in the event a PWS alert occurs. The following windshear criteria may be beneficial in establishing policies:

- reports of windshear from other aircraft
- visual indications
- tower windshear alerts
- differences between computed winds in the airplane and reported winds from the tower.

Administrative Information

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-27 "IN EFFECT" (IE)

This FCOM bulletin will be revised to include Service Bulletin information when available.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
for
easyJet

The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-29

Date: June 04, 2004

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Center Tank Fuel System Changes

Reason: This bulletin provides information about center tank fuel system changes for 737-600/-700/-800/-900 airplanes.

Information in this Flight Crew Operations Manual (FCOM) bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has introduced center tank fuel system changes in production, at Production Line Number 1494 and on, with deliveries starting in May 2004. These revisions include a Master Caution system logic change, center tank fuel pump auto shutoff and CONFIG alert logic change. These system updates will be available for post-production retrofit via Boeing Service Bulletins no later than fourth quarter 2004.

The Master Caution system logic has been revised so the Master Caution lights and the FUEL system annunciator light illuminate when either center tank fuel pump indicates low pressure, as opposed to the original Master Caution system logic that requires both center tank fuel pumps to indicate low pressure before the Master Caution lights and the FUEL system annunciator light illuminate. As a result of this system logic change, Master Caution light recall will no longer cause the Master Caution and FUEL annunciator lights to illuminate if one center tank fuel pump switch is positioned OFF and the other is positioned ON.

To limit the potential for prolonged dry running of the center tank fuel pumps, a Center Tank Boost Pump Auto Shutoff system has been installed to automatically turn the affected center tank fuel pump off after 15 seconds of continuous low fuel pressure indication. The center tank fuel pump switch will remain in the ON

position and LOW PRESSURE will be illuminated until the flight crew positions the fuel pump switch to OFF. The auto shutoff feature will individually control the center tank fuel pumps and can be manually reset by turning the respective center tank fuel pump switch OFF, then ON. If no fuel is available, the pump will again turn off after 15 seconds of continuous low pressure. This system is intended to be a backup to normal flight crew procedures.

The CONFIG alert logic has been changed so that the alert is illuminated when center tank quantity is greater than 1600 pounds/726 kilograms, either engine is running and both center tank fuel pump switches are positioned OFF.

New Normal Procedures have been developed for airplanes with the center tank fuel system changes installed. These are presented in the Operating Instructions below. However, operators may continue to use the procedures contained in AD 2002-19-52 and AD 2002-24-51, or the procedures approved in FAA Approval Letter 140S-03-189 as an Alternative Method of Compliance (AMOC), until all center tank fuel pumps have been inspected and all airplanes in their fleet have been modified. The AD 2002-19-52 and AD 2002-24-51 procedures, as well as the AMOC procedures, were discussed in detail in the Flight Crew Operations Manual Bulletin titled "AD 2002-19-52 and AD 2002-24-51, Center Tank Fuel Pumps."

Operating Instructions

Operators must determine which of the three following procedures are to be used for their fleet.

The first two operating procedures were discussed in detail in the Flight Crew Operations Manual Bulletin titled "AD 2002-19-52 and AD 2002-24-51, Center Tank Fuel Pumps."

Operating Procedure 1 - AD 2002-19-52 and AD 2002-24-51

The procedures contained in AD 2002-19-52 and AD 2002-24-51 require flight crews to maintain certain minimum fuel levels in the center fuel tank when operating any Hydro-Aire fuel pump. These procedures must be used on those airplanes in which the center tank fuel pumps have not been inspected via an approved inspection process to ensure proper wire bundle positioning. These procedures may continue to be used after the center tank fuel pumps have been inspected and after installation of the center tank fuel system changes at the discretion of the operator for the time period AD 2002-19-52 and AD 2002-24-51 are in effect.

Operating Procedure 2 - Alternative Method of Compliance (AMOC) to AD 2002-24-51

FAA Approval Letter 140S-03-189 provides alternate procedures that may be used as an Alternative Method of Compliance (AMOC) to AD 2002-24-51 on those airplanes in which the center tank fuel pumps have been inspected via an approved inspection process. These procedures minimize dry running of the center tank fuel pumps, while reducing the potential for large quantities of fuel

remaining in the center tank. The AMOC procedures may continue to be used after installation of the center tank fuel system changes at the discretion of the operator for the time period AD 2002-24-51 is in effect.

NOTE: When using the AMOC procedures on airplanes with the new Master Caution system logic, Master Caution light recall will not cause the Master Caution lights and FUEL system annunciator light to illuminate if one center tank fuel pump switch is positioned OFF and the other is positioned ON.

NOTE: The fuel crossfeed valve must be closed for takeoff and landing.

Operating Procedure 3 - Normal Procedures (Airplanes with Center Tank Fuel System Changes)

The Normal Procedures presented below may be used on those airplanes in which the center tank fuel pumps have been inspected via an approved inspection process to ensure proper wire bundle positioning (AD 2002-19-52) and in which the center tank fuel system changes have been installed in production or via Boeing service bulletins.

Climb and Cruise Procedure

During climb, position both center tank fuel pump switches OFF when one center tank fuel pump LOW PRESSURE light illuminates.

When established in a level attitude at cruise, if the center tank contains usable fuel and the center tank fuel pump switches are OFF, position the center tank fuel pump switches ON again.

Position both center tank fuel pump switches OFF when the center tank is empty.

Descent and Approach Procedure

During descent, position both center tank fuel pump switches OFF when one center tank fuel pump LOW PRESSURE light illuminates.

If established in level flight for an extended period of time (for example, holding) with usable fuel in the center tank and the center tank fuel pump switches OFF, the center tank fuel pump switches may be positioned ON again.

Position both center tank fuel pump switches OFF when the center tank is empty.

NOTE: After a center tank fuel pump has been automatically shutoff, it can be manually reset by turning the respective center tank fuel pump switch OFF, then ON. If no fuel is available, the pump will again turn off after 15 seconds of continuous low pressure. The center tank fuel pump switch will remain in the ON position and the LOW PRESSURE light will be illuminated until the flight crew positions the fuel pump switch to OFF.

Administrative Information

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-29 "IN EFFECT" (IE)

This bulletin will be canceled after Boeing is notified that all affected airplanes in your fleet have the center tank fuel system changes incorporated and the center tank fuel pumps inspected via an approved inspection process to ensure proper wire bundle positioning.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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Flight Crew Operations Manual Bulletin
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The Boeing Company
Seattle, Washington 98124-2207

737

Number: EZY-30 R1

Date: April 15, 2005

Document Effectivity: D6-27370-73V-EZY(3V)

Subject: Nuisance Stall Warning Stick Shaker Events

Reason: This bulletin provides information about nuisance stall warning stick shaker events experienced on 737-600/700/800/900 airplanes. The purpose of this reissue is to revise the crew action when maneuvering during flap retraction from Flaps 1 to Flaps Up with anti-ice selected ON.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

A nuisance stall warning stick shaker event is one in which the stick shaker activates although the airplane is not near a stall condition. In-service incidents have revealed corners of the operating envelope where turbulence or additional maneuver loads can result in momentary nuisance stick shaker events. Boeing has determined the following flight conditions can lead to nuisance stick shaker events:

1. Encountering moderate to severe turbulence when operating at or near the Maximum Operating Altitude.
2. Maneuvering during flap retraction from Flaps 1 to Flaps Up after takeoff or during a missed approach when Engine Anti-Ice is ON or when Wing Anti-Ice has been selected ON after liftoff.
3. Maneuvering at V2 speed following an engine failure on takeoff when Wing Anti-Ice has been selected ON after liftoff.

Boeing is investigating design changes to the Stall Management/Yaw Damper (SMYD) computer logic to minimize the frequency of these events.

Operating Instructions

Scenario 1: Moderate to severe turbulence is encountered when operating at or near the Maximum Operating Altitude.

Crew Action:

No change in operations is required. Flight crews should be aware stall warning stick shaker events have occurred in moderate turbulence, particularly when flying near the lower amber band when at or near maximum operating altitudes.

Scenario 2: After takeoff or missed approach, the airplane is maneuvered during flap retraction from Flaps 1 to Flaps Up with Engine Anti-Ice ON or Wing Anti-Ice selected ON after liftoff.

Crew Action:

During flap retraction from Flaps 1 to Flaps Up, limit bank angle to 15 degrees and avoid higher maneuver loading of the aircraft until the Leading Edge Flaps Transit light has extinguished. If a higher bank angle is required during this time, avoid the selection of Flaps 1 to Flaps Up until maneuvering is complete or bank angles are 15 degrees or less.

NOTE: A non-maneuvering segment of approximately 1 nm during all-engine operations or approximately 2.5 nm for an engine-out operation will allow for flaps to be retracted from Flaps 1 to Flaps Up.

Scenario 3: The airplane is maneuvered at V2 speed following an engine failure on takeoff when Wing Anti Ice has been selected ON after liftoff.

Crew Action:

Do not turn Wing Anti-Ice ON until airspeed has increased to at least V2+15 knots.

Administrative Information

This bulletin replaces bulletin EZY-30, dated November 16, 2004. Discard bulletin EZY-30. Revise the Bulletin Record to show EZY-30 as "CANCELLED" (CANC).

Insert this bulletin behind the FCOM Bulletin Record Page in Volume 1 of your FCOM. Amend the FCOM Bulletin Record Page to show Bulletin EZY-30 R1 "IN EFFECT" (IE).

This FCOM bulletin will be revised to include Service Bulletin information when available.

Please send all correspondence regarding FCOM bulletin status to one of the following addresses:

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General

This chapter contains Airplane Flight Manual (AFM) limitations and Boeing recommended operating limitations. Limitations that are obvious, shown on displays or placards, or incorporated within an operating procedure are not contained in this chapter.

Airplane General

Operational Limitations

Runway slope	+/– 2%
Maximum Takeoff and Landing Tailwind Component	10 knots
Maximum speeds	Observe gear and flap placards
Maximum Operating Altitude	41,000 ft
Maximum Takeoff and Landing Altitude	8,400 ft

Maximum flight operating latitude – 82° North and 82° South, except for the region between 80° West and 130 ° West longitude, the maximum flight operating latitude is 70° North, and the region between 120° East and 160° East longitude, the maximum flight operating latitude is 60° South.

Installation of handle covers on the overwing exits must be verified prior to departure whenever passengers are carried.

Verify that an operational check of the flight deck door access system has been accomplished according to approved procedures once each flight day.

Non–AFM Operational Information

Note: The following items are not AFM limitations, but are provided for flight crew information.

On revenue flights, the escape slide retention bar (girt bar) must be installed during taxi, takeoff and landing.

The maximum demonstrated takeoff and landing crosswind is 36 knots.

Altitude Display Limits for RVSM Operations

Standby altimeters do not meet altimeter accuracy requirements of RVSM airspace.

The maximum allowable in-flight difference between Captain and First Officer altitude displays for RVSM operations is 200 feet.

The maximum allowable on-the-ground altitude display differences for RVSM operations are:

Field Elevation	Max Difference Between Captain & F/O	Max Difference Between Captain or F/O & Field Elevation
Sea Level to 5,000 feet	50 feet	75 feet
5,001 to 10,000 feet	60 feet	75 feet

Weight Limitations

Weights	Kilograms
Maximum Taxi Weight	60,554
Maximum Takeoff Weight	60,327
Maximum Landing Weight	58,059
Maximum Zero Fuel Weight	54,657

Weights	Kilograms
Maximum Taxi Weight	62,822
Maximum Takeoff Weight	62,595
Maximum Landing Weight	58,059
Maximum Zero Fuel Weight	54,657

Weights	Kilograms
Maximum Taxi Weight	65,090
Maximum Takeoff Weight	64,863
Maximum Landing Weight	58,059
Maximum Zero Fuel Weight	54,657

Air Systems

Pressurization

The maximum cabin differential pressure (relief valves) is 9.1 psi.

Non–AFM Operational Information

Note: The following items are not AFM limitations, but are provided for flight crew information.

With engine bleed air switches ON, do not operate the air conditioning packs in HIGH for takeoff, approach or landing.

Anti–Ice, Rain

Engine TAI must be on when icing conditions exist or are anticipated, except during climb and cruise below -40°C SAT.

Autopilot/Flight Director System

Use of aileron trim with the autopilot engaged is prohibited.

Do not engage the autopilot for takeoff below 400 feet AGL.

The autopilot must be disengaged before the airplane descends more than 50 feet below the minimum descent altitude (MDA) unless it is coupled to an ILS glide slope and localizer or in the go-around mode.

The Minimum Use Height (MUH) for single channel autopilot operation is defined as 135 feet AGL.

Maximum allowable wind speeds, when conducting a dual channel Cat II or Cat III landing predicated on autoland operations, are:

- Headwind 25 knots
- Crosswind 20 knots
- Tailwind 10 knots.

Maximum and minimum glideslope angles for autoland are 3.25 degrees and 2.5 degrees respectively.

Autoland capability may only be used with flaps 30 or 40 and both engines operative.

Communications

Non–AFM Operational Information

Note: The following items are not AFM limitations, but are provided for flight crew information.

Use the VHF radio connected to the top of fuselage antenna for primary ATC communications on the ground.

Engines and APU

Engine Limit Display Markings

Maximum and minimum limits are red.

Caution limits are amber.

Engine Ignition

Engine ignition must be on for:

- takeoff
- landing
- operation in heavy rain
- anti-ice operation.

Reverse Thrust

Intentional selection of reverse thrust in flight is prohibited.

APU

APU bleed + electrical load: max alt 10,000 ft.

APU bleed: max alt 17,000 ft.

APU electrical load: max alt 41,000 ft.

Non–AFM Operational Information

Note: The following items are not AFM limitations, but are provided for flight crew information.

APU bleed valve must be closed when:

- ground air connected and isolation valve open
- engine no. 1 bleed valve open
- isolation and engine no. 2 bleed valves open.

APU bleed valve may be open during engine start, but avoid engine power above idle.

Flight Controls

Max flap extension altitude is 20,000 ft.

Holding in icing conditions with flaps extended is prohibited.

Do not deploy the speedbrakes in flight at radio altitudes less than 1,000 feet.

In flight, do not extend the SPEED BRAKE lever beyond the FLIGHT DETENT.

Flaps 15 normal landings are prohibited. A Flaps 15 landing may be performed when required by a non-normal procedure.

Avoid rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large side slip angles) as they may result in structural failure at any speed, including below VA.

Non–AFM Operational Information

Note: The following items are not AFM limitations, but are provided for flight crew information.

Alternate flap duty cycle:

Flap Position	Minutes Off
0 – 15	5
greater than 15	25

Flight Management, Navigation

Air Data Inertial Reference Unit (ADIRU)

ADIRU alignment must not be attempted at latitudes greater than 78 degrees 15 minutes.

QFE Selection

The use of LNAV or VNAV with QFE selected is prohibited.

Look-Ahead Terrain Alerting (GPWS)

Do not use the terrain display for navigation.

Do not use the look-ahead terrain alerting and terrain display functions:

- within 15 nm of takeoff, approach or landing at an airport not contained in the GPWS terrain database

Note: Refer to Honeywell Document 060-4267-000 for airports and runways contained in the installed GPWS terrain database.

Fuel System

The use of Wide Cut Fuels per Class B of GE Specification D50TF2, JP-4 or Jet B, is prohibited.

Maximum tank fuel temperature: 49°C.

Minimum inflight tank fuel temperature: 3°C above the freezing point of the fuel being used or -43°C, whichever is higher.

Fuel Balance

Lateral imbalance between main tanks 1 and 2 must be scheduled to be zero. Random fuel imbalance must not exceed 453 kgs for taxi, takeoff, flight or landing.

Main tanks 1 and 2 must be full if center tank contains more than 453 kgs.

Landing Gear

Operation with assumed temperature reduced takeoff thrust is not permitted with anti-skid inoperative.

Towbarless towing operations are restricted to tow vehicles that are designed and operated to preclude damage to the airplane steering system or which provide a reliable and unmistakable warning when damage to the steering system may have occurred.

Non–AFM Operational Information

Note: The following items are not AFM limitations, but are provided for flight crew information.

Do not apply brakes until after touchdown.

General

This chapter gives:

- an introduction to the normal procedures philosophy and assumptions
- step by step normal procedures

Normal Procedures Philosophy and Assumptions

Normal procedures verify for each phase of flight that:

- the airplane condition is satisfactory
- the flight deck configuration is correct

Normal procedures are done on each flight. Refer to the Supplementary Procedures (SP) chapter for procedures that are done as needed, for example the adverse weather procedures.

Normal procedures are used by a trained flight crew and assume:

- all systems operate normally
- the full use of all automated features (LNAV, VNAV, autoland, autopilot, and autothrottle).

Normal procedures also assume coordination with the ground crew before:

- hydraulic system pressurization, or
- flight control surface movement, or
- airplane movement

Normal procedures do not include steps for flight deck lighting and crew comfort items.

Normal procedures are done by recall and scan flow. The panel illustration in this section shows the scan flow. The scan flow sequence may be changed as needed.

Configuration Check

It is the crew member’s responsibility to verify correct system response. Before engine start, use system lights to verify each system's condition or configuration. After engine start, the master caution system alerts the crew to warnings or cautions away from the normal field of view.

If there is an incorrect configuration or response:

- verify that the system controls are set correctly
- check the respective circuit breaker as needed. Maintenance must first determine that it is safe to reset a tripped circuit breaker on the ground
- test the respective system light as needed

Before engine start, use individual system lights to verify the system status. If an individual system light indicates an improper condition:

- check the Dispatch Deviations Procedures Guide (DDPG) or the operator equivalent to decide if the condition has a dispatch effect
- decide if maintenance is needed

If, during or after engine start, a red warning or amber caution light illuminates:

- do the respective non-normal checklist (NNC)
- on the ground, check the DDPG or the operator equivalent

If, during recall, an amber caution illuminates and then extinguishes after a master caution reset:

- check the DDPG or the operator equivalent
- the respective non-normal checklist is not needed

Crew Duties

Preflight and postflight crew duties are divided between the captain and first officer. Phase of flight duties are divided between the Pilot Flying (PF) and the Pilot Monitoring (PM.)

Each crewmember is responsible for moving the controls and switches in their area of responsibility. The Area of Responsibility illustrations in this section show the area of responsibility for both normal and non-normal procedures. Typical panel locations are shown.

The captain may direct actions outside of the crewmember's area of responsibility.

The general PF phase of flight responsibilities are:

- taxiing
- flight path and airspeed control
- airplane configuration
- navigation.

The general PM phase of flight responsibilities are:

- checklist reading
- communications
- tasks asked for by the PF
- monitoring taxiing, flight path, airspeed, airplane configuration and navigation.

PF and PM duties may change during a flight. For example, the captain could be the PF during taxi but be the PM during takeoff through landing.

Normal procedures show who does a step by crew position (C, F/O, PF, or PM):

- in the procedure title, or
- in the far right column, or
- in the column heading of a table

The mode control panel is the PF's responsibility. When flying manually, the PF directs the PM to make the changes on the mode control panel.

The captain is the final authority for all tasks directed and done.

Control Display Unit (CDU) Procedures

Before taxi, the captain or first officer may make CDU entries. The other pilot must verify the entries.

Make CDU entries before taxi or when stopped, when possible. If CDU entries must be made during taxi, the PM makes the entries. The PF must verify the entries before they are executed.

In flight, the PM usually makes the CDU entries. The PF may also make simple, CDU entries when the workload allows. The pilot making the entries executes the change only after the other pilot verifies the entries.

During high workload times, for example departure or arrival, try to reduce the need for CDU entries. Do this by using the MCP heading, altitude, and speed control modes. The MCP can be easier to use than entering complex route modifications into the CDU.

Autopilot Flight Director System (AFDS) Procedures

The crew must always monitor:

- airplane course
- vertical path
- speed

When selecting a value on the MCP, verify that the respective value changes on the flight instruments, as applicable.

The crew must verify manually selected or automatic AFDS changes. Use the FMA to verify mode changes for the:

- autopilot
- flight director
- autothrottle

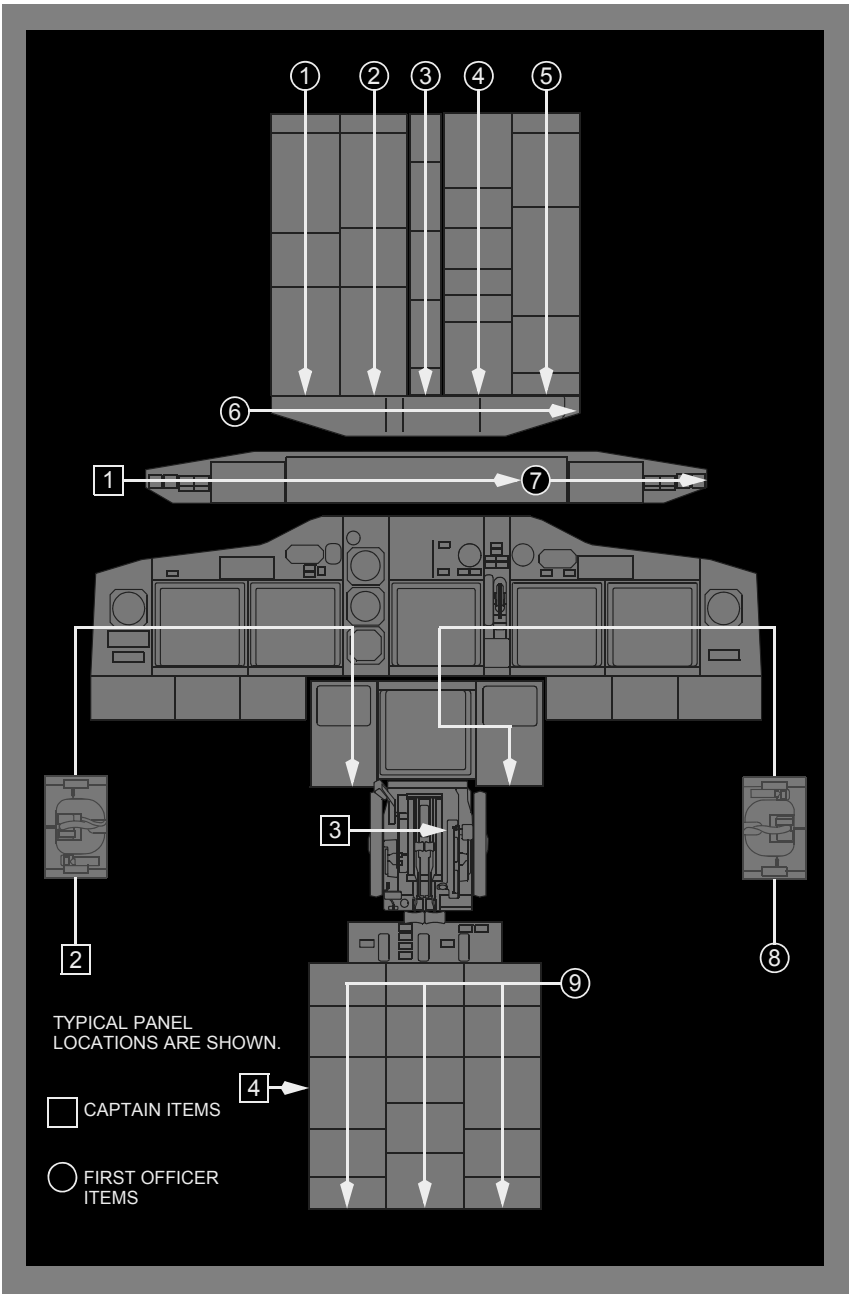
During LNAV and VNAV operations, verify all changes to the airplane's:

- course
- vertical path

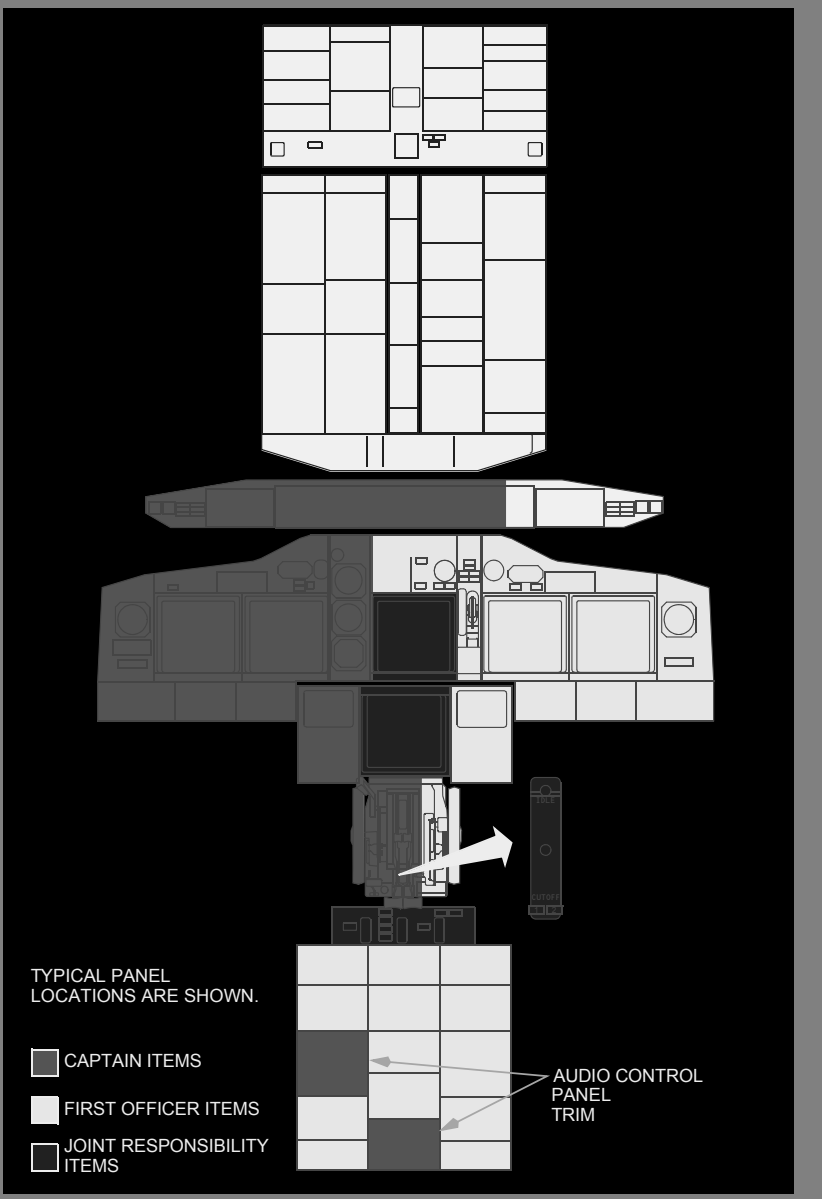
- thrust
- speed

Announcing changes on the FMA and thrust mode display when they occur is a good CRM practice.

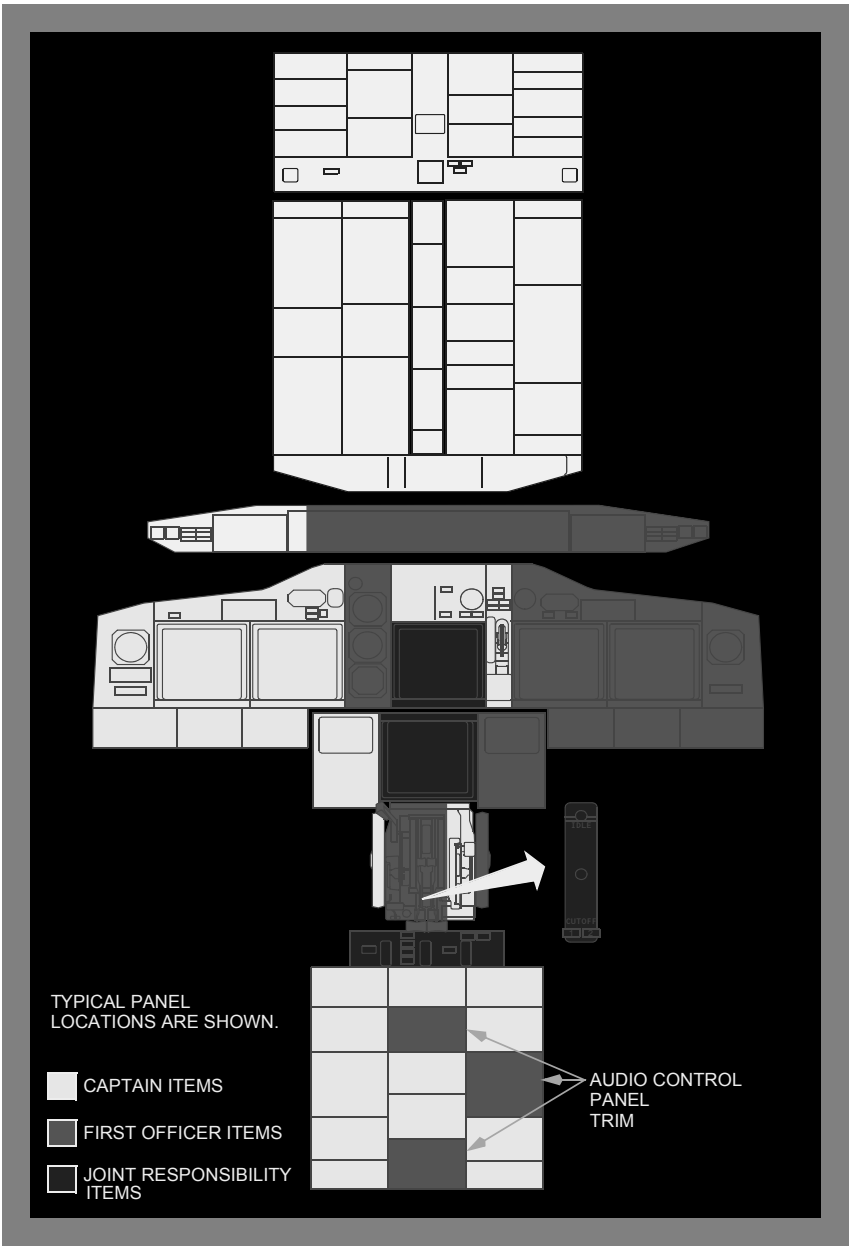
Preflight and Postflight Scan Flow



Areas of Responsibility - Captain as Pilot Flying or Taxiing



Areas of Responsibility - First Officer as Pilot Flying or Taxiing



Intentionally
Blank

Preliminary Preflight Procedure – Captain or First Officer

The Preliminary Preflight Procedure assumes that the Electrical Power Up supplementary procedure is complete.

A full IRS alignment is recommended before each flight. If time does not allow a full alignment, do the Fast Realignment supplementary procedure.

IRS mode selectors .....OFF, then NAV

Verify that the ON DC lights illuminate then extinguish.

Verify that the ALIGN lights are illuminated.

VOICE RECORDER switch .....As needed

Verify that the following are sufficient for flight:
- oxygen pressure
- hydraulic quantity
- engine oil quantity

Do the remaining actions after a crew change or maintenance action.

Maintenance documents ..... Check

FLIGHT DECK ACCESS SYSTEM switch ..... Guard closed

Emergency equipment ..... Check

Fire extinguisher – Checked and stowed

Crash axe – Stowed

Escape ropes – Stowed

Other needed equipment – Checked and stowed

PSEU light ..... Verify extinguished

GPS light ..... Verify extinguished

SERVICE INTERPHONE switch ..... OFF

ENGINE panel ..... Set

Verify that the REVERSER lights are extinguished.

Verify that the ENGINE CONTROL lights are extinguished.

EEC switches – ON

Oxygen panel ..... Set

Note: PASSENGER OXYGEN switch activation causes deployment of the passenger oxygen masks.

PASSENGER OXYGEN switch - Guard closed

Verify that the PASS OXY ON light is extinguished.

Verify pressure meets dispatch requirements.

Landing gear indicator lights ..... Verify illuminated

ELT switch ..... Guard closed

Verify that the ON light is extinguished.

Flight recorder switch ..... Guard closed

Circuit breakers (P6 panel) ..... Check

Manual gear extension access door ..... Closed

Circuit breakers (control stand, P18 panel) ..... Check

Parking brake ..... As needed

Set the parking brake if brake wear indicators will be checked during the exterior inspection.

CDU Preflight Procedure - Captain and First Officer

Start the CDU Preflight Procedure anytime after the Preliminary Preflight Procedure. The Initial Data and Navigation Data entries must be complete before the flight instrument check during the Preflight Procedure. The Performance Data entries must be complete before the Before Start Checklist.

The captain or first officer may make CDU entries. The other pilot must verify the entries.

Enter data in all the boxed items on the following CDU pages.

Enter data in the dashed items or modify small font items that are listed in this procedure. Enter or modify other items at pilot's discretion.

Failure to enter enroute winds can result in flight plan time and fuel burn errors.

Initial Data .....Set

IDENT page:

Verify that the MODEL is correct.

Verify that the ENG RATING is correct.

Verify that the navigation data base ACTIVE date range is current.

POS INIT page:

Verify that the time is correct.

Enter the present position on the SET IRS POS line. Use the most accurate latitude and longitude.

Navigation Data .....Set

ROUTE page:

Enter the ORIGIN.

Enter the route.

Enter the FLIGHT NUMBER.

Activate and execute the route.

DEPARTURES page:

Select the runway and departure routing.

Execute the runway and departure routing.

Verify that the ROUTE and LEGS pages are correct.

Performance Data ..... Set

PERF INIT page:

Enter the ZFW.

Verify that the FUEL on the CDU, the dispatch papers, and the fuel quantity indicators agree.

If refueling is not complete, enter the PLAN trip fuel as needed.

Verify that the fuel is sufficient for flight.

Verify that the gross weight and cruise CG (GW/CRZ CG) on the CDU and the dispatch papers agree.

Thrust mode display:

Verify that dashes are shown.

N1 LIMIT page:

Select an assumed temperature, or a fixed derate takeoff, or both as needed.

Select a full or a derated climb thrust as needed.

TAKEOFF REF page:

Make data entries on page 2/2 before page 1/2.

Enter the CG.

Verify that a trim value is shown.

Select or enter the takeoff V speeds.

Verify or enter a thrust reduction altitude.

Verify that the preflight is complete.

Exterior Inspection

Before each flight the captain, first officer, or maintenance crew must verify that the airplane is satisfactory for flight.

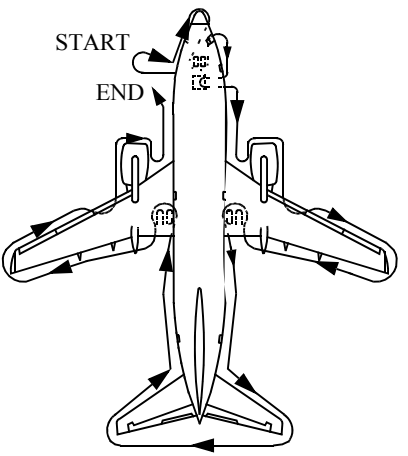
Items at each location may be checked in any sequence.

Use the detailed inspection route below to check that:

- the surfaces and structures are clear, not damaged, not missing parts and there are no fluid leaks
- the tires are not too worn, not damaged, and there is no tread separation
- the gear struts are not fully compressed
- the engine inlets and tailpipes are clear, the access panels are secured, the exterior is not damaged, and the reversers are stowed
- the doors and access panels that are not in use are latched
- the probes, vents, and static ports are clear and not damaged
- the skin area adjacent to the pitot probes and static ports is not wrinkled
- the antennas are not damaged
- the light lenses are clean and not damaged

For cold weather operations see the Supplementary Procedures.

Inspection Route



Left Forward Fuselage

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Doors and access panels (not in use) ..... Latched

Nose

Radome ..... Check

Conductor straps - Secure

Forward E and E door ..... Secure

Nose Wheel Well

Tires and wheels ..... Check

Exterior light ..... Check

Gear strut and doors ..... Check

Nose wheel steering assembly ..... Check

Nose gear steering lockout pin ..... As needed

Gear pin ..... As needed

Nose wheel spin brake (snubbers) ..... In place

Right Forward Fuselage

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Oxygen pressure relief green disc ..... In place

Doors and access panels (not in use) ..... Latched

Right Wing Root, Pack, and Lower Fuselage

Ram air deflector door ..... Extended

Pack and pneumatic access doors ..... Secure

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Exterior lights ..... Check

Leading edge flaps ..... Check

Number 2 Engine

Access panels ..... Latched

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Fan blades, probes, and spinner ..... Check

Thrust reverser ..... Stowed

Exhaust area and tailcone ..... Check

Right Wing and Leading Edge

Access panels ..... Latched

Leading edge flaps and slats ..... Check

Fuel measuring sticks ..... Flush and secure

Wing Surfaces ..... Check

Fuel tank vent ..... Check

Right Wing Tip and Trailing Edge

Position and strobe lights ..... Check

Static discharge wicks ..... Check

Aileron and trailing edge flaps ..... Check

Right Main Gear

Tires, brakes and wheels ..... Check

Verify that the wheel chocks are in place as needed.

If the parking brake is set, the brake wear indicator pins must extend out of the guides.

Gear strut, actuators, and doors ..... Check

Hydraulic lines ..... Secure

Gear pin ..... As needed

Right Main Wheel Well

APU FIRE CONTROL handle ..... Up

Wheel well ..... Check

Right Aft Fuselage

Doors and access panels (not in use) ..... Latched

Negative pressure relief door ..... Closed

Outflow valve ..... Check

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

APU air inlet ..... Open

Tail

Vertical stabilizer and rudder ..... Check

Elevator feel probes ..... Check

Horizontal stabilizer and elevator ..... Check

Static discharge wicks ..... Check

Strobe light ..... Check

APU cooling air inlet and exhaust outlet ..... Check

Left Aft Fuselage

Doors and access panels (not in use) ..... Latched

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Left Main Gear

Tires, brakes and wheels ..... Check

Verify that the wheel chocks are in place as needed.

If the parking brake is set, the brake wear indicator pins must extend out of the guides.

Gear strut, actuators, and doors ..... Check

Hydraulic lines ..... Secure

Gear pin ..... As needed

Left Main Wheel Well

Wheel well ..... Check

Engine fire bottle pressure ..... Check

Left Wing Tip and Trailing Edge

Aileron and trailing edge flaps ..... Check

Static discharge wicks ..... Check

Position and strobe lights ..... Check

Left Wing and Leading Edge

Fuel tank vent ..... Check

Wing Surfaces ..... Check

Fuel measuring sticks ..... Flush and secure

Leading edge flaps and slats ..... Check

Access panels ..... Latched

Number 1 Engine

Exhaust area and tailcone ..... Check

Thrust reverser ..... Stowed

Fan blades, probes, and spinner ..... Check

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Access panels ..... Latched

Left Wing Root, Pack, and Lower Fuselage

Leading edge flaps ..... Check

Probes, sensors, ports, vents, and drains (as applicable) ..... Check

Exterior lights ..... Check

Pack and pneumatic access doors ..... Secure

Ram air deflector door ..... Extended

Preflight Procedure – First Officer

The first officer normally does this procedure. The captain may do this procedure as needed.

Flight control panel ..... Check

FLIGHT CONTROL switches – Guards closed

Verify that the flight control LOW PRESSURE lights are illuminated.

Flight SPOILER switches – Guards closed

YAW DAMPER switch – ON

Verify that the YAW DAMPER light is extinguished.

Verify that the standby hydraulic LOW QUANTITY light is extinguished.

Verify that the standby hydraulic LOW PRESSURE light is extinguished.

G-EZJU - G-EZKG
(SB changes G-EZJA - G-EZJT)

Verify that the STBY RUD ON light is extinguished.

ALTERNATE FLAPS master switch – Guard closed

ALTERNATE FLAPS position switch – OFF

Verify that the FEEL DIFF PRESS light is extinguished.

Verify that the SPEED TRIM FAIL light is extinguished.

Verify that the MACH TRIM FAIL light is extinguished.

Verify that the AUTO SLAT FAIL light is extinguished.

NAVIGATION panel ..... Set

VHF NAV transfer switch – NORMAL

IRS transfer switch – NORMAL

FMC transfer switch – NORMAL

DISPLAYS panel .....Set

SOURCE selector – AUTO

CONTROL PANEL select switch – NORMAL

Fuel panel .....Set

Verify that the ENG VALVE CLOSED lights are illuminated dim.

Verify that the SPAR VALVE CLOSED lights are illuminated dim.

Verify that the FILTER BYPASS lights are extinguished.

CROSSFEED selector – Closed

Verify that the VALVE OPEN light is extinguished.

FUEL PUMP switches – OFF

Verify that the center tank fuel pump LOW PRESSURE lights are extinguished.

Verify that the main tank fuel pump LOW PRESSURE lights are illuminated.

Electrical panel .....Set

BATTERY switch – Guard closed

G-EZJO - G-EZKG

CAB/UTIL power switch – ON

G-EZJO - G-EZKG

IFE/PASS SEAT power switch – ON

G-EZJA - G-EZJN

GALLEY power switch – ON

STANDBY POWER switch – Guard closed

Verify that the STANDBY PWR OFF light is extinguished.

Verify that the BAT DISCHARGE light is extinguished.

Verify that the TR UNIT light is extinguished.

Verify that the ELEC light is extinguished.

Generator drive DISCONNECT switches – Guards closed

Verify that the DRIVE lights are illuminated.

BUS TRANSFER switch – Guard closed

Verify that the TRANSFER BUS OFF lights are extinguished.

Verify that the SOURCE OFF lights are extinguished.

Verify that the GEN OFF BUS lights are illuminated.

Overheat and fire protection panel ..... Check

Do this check if the flight crew did not do the Electrical Power Up supplementary procedure. This check is needed once per flight day.

Verify that the engine No. 1, APU, and engine No. 2 fire switches are in.

Alert ground personnel before the following test is accomplished:

OVERHEAT DETECTOR switches – NORMAL

TEST switch – Hold to FAULT/INOP

Verify that the MASTER CAUTION lights are illuminated.

Verify that the OVHT/DET annunciator is illuminated.

Verify that the FAULT light is illuminated.

If the FAULT light fails to illuminate, the fault monitoring system is inoperative.

Verify that the APU DET INOP light is illuminated.

Do not run the APU if the APU DET INOP light does not illuminate.

Note: The fire warning light flashes and the horn sounds on the APU ground control panel when this test is done with the APU running. This can be mistaken by the ground crew as an APU fire.

TEST switch – Hold to OVHT/FIRE

Verify that the fire warning bell sounds.

Verify that the master FIRE WARN lights are illuminated.

Verify that the MASTER CAUTION lights are illuminated.

Verify that the OVHT/DET annunciator is illuminated.

Master FIRE WARN light – Push

Verify that the master FIRE WARN lights are extinguished.

Verify that the fire warning bell cancels.

Verify that the engine No. 1, APU and engine No. 2 fire switches stay illuminated.

Verify that the ENG 1 OVERHEAT and ENG 2 OVERHEAT lights stay illuminated.

Verify that the WHEEL WELL light stays illuminated.

EXTINGUISHER TEST switch – Check

TEST switch – Position to 1 and hold.

Verify that the three green extinguisher test lights are illuminated.

TEST switch – Release

Verify that the three green extinguisher test lights are extinguished.

Repeat for test position 2.

APU switch (as needed) ..... START

Note: If extended APU operation is needed on the ground, position an AC operated fuel pump ON. If fuel is loaded in the center tank, position the left center tank fuel pump switch ON to prevent a fuel imbalance before takeoff.

CAUTION: Center tank fuel pump switches should be positioned ON only if the fuel quantity in the center tank exceeds 453 kgs.

CAUTION: Do not operate the center tank fuel pumps with the flight deck unattended.

Note: Whenever the APU is operating and AC electrical power is on the airplane busses, operate at least one fuel boost pump to supply fuel under pressure to the APU to extend the service life of the APU fuel control unit.

When the APU GEN OFF BUS light is illuminated:

APU GENERATOR bus switches – ON

Verify that the SOURCE OFF lights are extinguished.

Verify that the TRANSFER BUS OFF lights are extinguished.

EQUIPMENT COOLING switches ..... NORM

Verify that the OFF lights are extinguished.

EMERGENCY EXIT LIGHTS switch ..... Guard closed

Verify that the NOT ARMED light is extinguished.

Passenger signs ..... Set

FASTEN BELTS switch – AUTO or ON

Windshield WIPER selectors ..... PARK

Verify that the windshield wipers are stowed.

WINDOW HEAT switches ..... ON

Position switches ON at least 10 minutes before takeoff.

Verify that the OVERHEAT lights are extinguished.

Verify that the ON lights are illuminated (except at high ambient temperatures.)

PROBE HEAT switches ..... OFF

Verify that all lights are illuminated.

WING ANTI–ICE switch ..... OFF

Verify that the VALVE OPEN lights are extinguished.

ENGINE ANTI–ICE switches ..... OFF

Verify that the COWL ANTI–ICE lights are extinguished.

Verify that the COWL VALVE OPEN lights are extinguished.

Hydraulic panel ..... Set

ENGINE HYDRAULIC PUMPS switches – ON

Verify that the LOW PRESSURE lights are illuminated.

ELECTRIC HYDRAULIC PUMPS switches – OFF

Verify that the OVERHEAT lights are extinguished.

Verify that the LOW PRESSURE lights are illuminated.

Air conditioning panel ..... Set

AIR TEMPERATURE source selector – As needed

Verify that the DUCT OVERHEAT lights are extinguished.

Temperature selectors – As needed

Verify that the RAM DOOR FULL OPEN lights are illuminated.

RECIRCULATION FAN switch – AUTO

Air conditioning PACK switches – AUTO or HIGH

ISOLATION VALVE switch – OPEN

Engine BLEED air switches – ON

APU BLEED air switch – ON

Verify that the DUAL BLEED light is illuminated.

Verify that the PACK TRIP OFF lights are extinguished.

Verify that the WING–BODY OVERHEAT lights are extinguished.

Verify that the BLEED TRIP OFF lights are extinguished.

Cabin pressurization panel ..... Set

Verify that the AUTO FAIL light is extinguished.

Verify that the OFF SCHED DESCENT light is extinguished.

FLIGHT ALTITUDE indicator – Cruise altitude

LANDING ALTITUDE indicator – Destination field elevation

Pressurization mode selector – AUTO

Lighting panel ..... Set

LANDING light switches – RETRACT and OFF

RUNWAY TURNOFF light switches – OFF

TAXI light switch – OFF

Ignition select switch .....IGN L or R

Alternate the ignition select switch position on subsequent starts.

ENGINE START switches ..... OFF

Lighting panel ..... Set

LOGO light switch – As needed

POSITION light switch – As needed

ANTI–COLLISION light switch – OFF

WING illumination switch – As needed

WHEEL WELL light switch – As needed

Mode control panel ..... Set

COURSE(S) – Set

FLIGHT DIRECTOR switch – ON

Move the switch for the pilot flying to ON first.

EFIS control panel .....Set

MINIMUMS reference selector – RADIO or BARO

MINIMUMS selector – Set decision height or altitude reference

FLIGHT PATH VECTOR switch – As needed

METERS switch – As needed

BAROMETRIC reference selector – IN or HPA

BAROMETRIC selector – Set local altimeter setting

VOR/ADF switches – As needed

Mode selector – MAP

CENTER switch – As needed

Range selector – As needed

TRAFFIC switch – As needed

WEATHER RADAR – Off

Verify that the weather radar indications are not shown on the MAP.

Map switches – As needed

Oxygen .....Test and set

Crew oxygen pressure – Check

Verify that the pressure is sufficient for dispatch.

Oxygen mask – Stowed and doors closed

RESET/TEST switch – Push and hold

Verify that the yellow cross shows momentarily in the flow indicator.

EMERGENCY/TEST selector – Push and hold

Continue to hold the RESET/TEST switch down and push the EMERGENCY/TEST selector for 5 seconds. Verify that the yellow cross shows continuously in the flow indicator.

Verify that the crew oxygen pressure does not decrease more than 100 psig.

If the oxygen cylinder valve is not in the full open position, pressure can:

- decrease rapidly, or
- decrease more than 100 psig, or
- increase slowly back to normal.

Release the RESET/TEST switch and the EMERGENCY/TEST selector. Verify that the yellow does not show in the flow indicator.

Normal/100% selector – 100%

Clock ..... Set

TIME/DATE pushbutton - UTC time

Display select panel ..... Set

MAIN PANEL DISPLAY UNITS selector – NORM

LOWER DISPLAY UNIT selector – NORM

Disengage light TEST switch ..... Hold to 1

Verify that the A/P light is illuminated steady amber.

Verify that the A/T light is illuminated steady amber.

Verify that the FMC light is illuminated steady amber.

Disengage light TEST switch ..... Hold to 2

Verify that the A/P light is illuminated steady red.

Verify that the A/T light is illuminated steady red.

Verify that the FMC light is illuminated steady amber.

Do the Initial Data and Navigation Data steps from the CDU Preflight Procedure and verify that the IRS alignment is complete before checking the flight instruments.

Flight instruments ..... Check

Verify that the flight instrument indications are correct.

Verify that only these flags are shown:

- TCAS OFF
- NO VSPD until V–speeds are selected
- expected RMI flags

Verify that the flight mode annunciations are correct:

Note: Autothrottle mode and AFDS status are blank until the MCP is set in the Before Start procedure.

- autothrottle mode is blank
- roll mode is blank
- pitch mode is blank
- AFDS status is FD

Select the map mode.

GROUND PROXIMITY panel ..... Check

FLAP INHIBIT switch – Guard closed

GEAR INHIBIT switch – Guard closed

TERRAIN INHIBIT switch – Guard closed

Verify that the INOP light is extinguished.

Landing gear panel .....Set

LANDING GEAR lever – DN

Verify that the green landing gear indicator lights are illuminated.

Verify that the red landing gear indicator lights are extinguished.

AUTO BRAKE selector ..... RTO

Verify that the AUTO BRAKE DISARM light is extinguished

ANTISKID INOP light ..... Verify extinguished

Engine display control panel .....Set

N1 SET selector – AUTO

SPEED REFERENCE selector – AUTO

FUEL FLOW switch – RATE

Engine instruments ..... Check

Verify that the primary and secondary engine indications show existing conditions.

Verify that no exceedance is shown.

Verify that the hydraulic quantity indications do not show RF.

CARGO FIRE panel ..... Check

This check is needed once per flight day or following a flight crew change.

DETECTOR SELECT switches – NORM

TEST switch – Push

Verify that the fire warning bell sounds.

Verify that the master FIRE WARN lights are illuminated.

Master FIRE WARN light – Push

Verify that the master FIRE WARN lights are extinguished.

Verify that the fire warning bell cancels.

Verify that the FWD and AFT lights stay illuminated.

Verify that the DETECTOR FAULT light stays extinguished.

Verify that the green EXTINGUISHER test lights stay illuminated.

Verify that the DISCH light stays illuminated.

Radio tuning panel ..... Set

WARNING: Do not key HF radio while airplane is being fueled. Injury to personnel or fire may result.

Verify that the OFF light is extinguished.

VHF NAVIGATION radios ..... Set for departure

Audio control panel ..... Set

ADF radios ..... Set

WEATHER RADAR panel ..... Set

Transponder panel ..... Set

STABILIZER TRIM override switch ..... Guard closed

WARNING: Do not put objects between the seat and the aisle stand. Injury can occur when the seat is adjusted.

Seat ..... Adjust

Adjust the seat for optimum eye reference.

Verify a positive horizontal (fore and aft) seat lock.

Rudder pedals ..... Adjust

Adjust the rudder pedals to allow full rudder pedal and brake pedal movement.

Seat belt and shoulder harness ..... Adjust

Do the PREFLIGHT checklist on the captain's command.

Preflight Procedure – Captain

The captain normally does this procedure. The first officer may do this procedure if needed.

Lights ..... Test

Master LIGHTS TEST and DIM switch – TEST

The fire warning lights are not checked during this test. Use individual test switches or push to test features to check lights which do not illuminate during the light test. Use scan flow to verify that all other lights are flashing or illuminated. Verify that all system annunciator panel lights are illuminated.

Master LIGHTS TEST and DIM switch – As needed

EFIS control panel ..... Set

MINIMUMS reference selector – RADIO or BARO

MINIMUMS selector – Set decision height or altitude reference

FLIGHT PATH VECTOR switch – As needed

METERS switch – As needed

BAROMETRIC reference selector – IN or HPA

BAROMETRIC selector – Set local altimeter setting

VOR/ADF switches – As needed

Mode selector – MAP

CENTER switch – As needed

Range selector – As needed

TRAFFIC switch – As needed

WEATHER RADAR – Off

Verify that the weather radar indications are not shown on the MAP.

Map switches – As needed

Mode control panel ..... Set

COURSE(S) – Set

FLIGHT DIRECTOR switch – ON

Move the switch for the pilot flying to ON first.

Bank angle selector – As needed

Autopilot DISENGAGE bar – UP

Oxygen ..... Test and set

Crew oxygen pressure – Check

Verify that the pressure is sufficient for dispatch.

Oxygen mask – Stowed and doors closed

RESET/TEST switch – Push and hold

Verify that the yellow cross shows momentarily in the flow indicator.

EMERGENCY/TEST selector – Push and hold

Continue to hold the RESET/TEST switch down and push the EMERGENCY/TEST selector for 5 seconds. Verify that the yellow cross shows continuously in the flow indicator.

Verify that the crew oxygen pressure does not decrease more than 100 psig.

If the oxygen cylinder valve is not in the full open position, pressure can:

- decrease rapidly, or
- decrease more than 100 psig, or
- increase slowly back to normal.

Release the RESET/TEST switch and the EMERGENCY/TEST selector. Verify that the yellow does not show in the flow indicator.

Normal/100% selector – 100%

Clock .....Set

TIME/DATE pushbutton - UTC time

NOSE WHEEL STEERING switch .....Guard closed

Display select panel .....Set

MAIN PANEL DISPLAY UNITS selector – NORM

LOWER DISPLAY UNIT selector – NORM

Disengage light TEST switch .....Hold to 1

Verify that the A/P light is illuminated steady amber.

Verify that the A/T light is illuminated steady amber.

Verify that the FMC light is illuminated steady amber.

Disengage light TEST switch .....Hold to 2

Verify that the A/P light is illuminated steady red.

Verify that the A/T light is illuminated steady red.

Verify that the FMC light is illuminated steady amber.

STAB OUT OF TRIM light..... Verify extinguished

Do the Initial Data and Navigation Data steps from the CDU Preflight Procedure and verify that the IRS alignment is complete before checking the flight instruments.

Flight instruments ..... Check

Verify that the flight instrument indications are correct.

Verify that only these flags are shown:

- TCAS OFF
- NO VSPD until V–speeds are selected
- expected RMI flags

Verify that the flight mode annunciations are correct:

Note: Autothrottle mode and AFDS status are blank until the MCP is set in the Before Start procedure.

- autothrottle mode is blank
- roll mode is blank
- pitch mode is blank
- AFDS status is FD

Select the map mode.

G-EZJA - G-EZJT

Standby instruments ..... Check

Standby horizon – Set

Gyro caging control – Pull, then release

Approach mode selector – As needed

Verify that the flight instrument indications are correct.

Verify that no flags are shown.

Standby altimeter – Set

Verify that the flight instrument indications are correct.

Verify that no flags are shown.

G-EZJU - G-EZKG

Integrated standby flight display ..... Set

Verify that the approach mode display is blank.

Set the altimeter.

Verify that the flight instrument indications are correct.

Verify that no flags or messages are shown.

G-EZJA - G-EZJT

Standby RMI ..... Set

Select either VOR or ADF.

SPEED BRAKE lever ..... DOWN detent

Verify that the SPEED BRAKE ARMED light is extinguished.

Verify that the SPEED BRAKE DO NOT ARM light is extinguished.

Verify that the SPEEDBRAKES EXTENDED light is extinguished.

Reverse thrust levers ..... Down

Forward thrust levers ..... Closed

FLAP lever ..... Set

Set the flap lever to agree with the flap position.

Parking brake ..... Set

Verify that the parking brake warning light is illuminated

Note: Do not assume that the parking brake will prevent airplane movement. Accumulator pressure can be insufficient.

Engine start levers ..... CUTOFF

STABILIZER TRIM cutout switches ..... NORMAL

Radio tuning panel ..... Set

WARNING: Do not key the HF radio when the airplane is being refueled. Injury to personnel or fire can occur.

Verify that the OFF light is extinguished.

VHF NAVIGATION radios ..... Set for departure

Audio control panel ..... Set

WARNING: Do not put objects between the seat and the aisle stand. Injury can occur when the seat is adjusted.

Seat ..... Adjust

Adjust the seat for optimum eye reference.

Verify a positive horizontal (fore and aft) seat lock.

Rudder pedals ..... Adjust

Adjust the rudder pedals to allow full rudder pedal and brake pedal movement.

Seat belt and shoulder harness ..... Adjust

Call "PREFLIGHT CHECKLIST."

Before Start Procedure

Start the Before Start Procedure after papers are on board.

Flight deck door ..... Closed and locked F/O

Verify that the LOCK FAIL light is extinguished.

Do the CDU Preflight Procedure – Performance Data steps before completing this procedure.

CDU display ..... Set C, F/O

Normally the PF selects the TAKEOFF REF page.

Normally the PM selects the LEGS page.

N1 bugs ..... Check C, F/O

Verify that the N1 reference bugs are correct.

IAS bugs ..... Set C, F/O

MCP ..... Set C

AUTOTHROTTLE ARM switch – ARM

IAS/MACH selector – Set V2

Arm LNAV as needed.

Initial heading – Set

Initial altitude – Set

Taxi and Takeoff briefings ..... Complete C, F/O

The pilot who will do the takeoff does the taxi and takeoff briefings.

Exterior doors ..... Verify closed F/O

Flight deck windows ..... Closed and locked C, F/O

Start clearance ..... Obtain C, F/O

Obtain a clearance to pressurize the hydraulic systems.

Obtain a clearance to start the engines.

If pushback is needed:

Verify that the nose gear steering lockout pin is installed, or, if the nose gear steering lockout pin is not used, depressurize hydraulic system A during the hydraulic panel set step. C, F/O

Fuel panel ..... Set F/O

If the center tank fuel quantity exceeds 460 kilograms:

LEFT and RIGHT CENTER FUEL PUMPS switches – ON

Verify that the LOW PRESSURE lights illuminate momentarily and then extinguish.

If the LOW PRESSURE light stays illuminated turn off the CENTER FUEL PUMPS switch.

AFT and FORWARD FUEL PUMPS switches – ON

Verify that the LOW PRESSURE lights are extinguished.

Hydraulic panel ..... Set F/O

If pushback is needed and the nose gear steering lockout pin is not installed:

WARNING: Do not pressurize hydraulic system A. Unwanted tow bar movement can occur.

System A HYDRAULIC PUMP switches – OFF

Verify that the system A pump LOW PRESSURE lights are illuminated.

System B electric HYDRAULIC PUMP switch – ON

Verify that the system B electric pump LOW PRESSURE light is extinguished.

Verify that the brake pressure is 2,800 psi minimum.

Verify that the system B pressure is 2,800 psi minimum.

If pushback is not needed, or if pushback is needed and the nose gear steering lockout pin is installed:

Electric HYDRAULIC PUMP switches – ON

Verify that the electric pump LOW PRESSURE lights are extinguished.

Verify that the brake pressure is 2,800 PSI minimum.

Verify that the system A and B pressures are 2,800 psi minimum.

ANTI COLLISION light switch ..... ON F/O

Trim ..... Set C

Check each trim for freedom of movement.

Stabilizer trim – ___ UNITS

Set the trim for takeoff.

Verify that the trim is in the green band.

Aileron trim – 0 units

Rudder trim – 0 units

Call “BEFORE START CHECKLIST.” C

Do the BEFORE START checklist. F/O

Pushback or Towing Procedure

The Engine Start procedure may be done during pushback or towing.

Establish communications with ground handling personnel. C

CAUTION: Do not hold or turn the nose wheel steering wheel during pushback or towing. This can damage the nose gear or the tow bar.

CAUTION: Do not use airplane brakes to stop the airplane during pushback or towing. This can damage the nose gear or the tow bar.

Set or release the parking brake as directed by ground handling personnel. C

When pushback or towing is complete:

Verify that the tow bar is disconnected. C

Verify that the nose gear steering lockout pin is removed. C

System A HYDRAULIC PUMPS switches – ON. F/O

Verify that the system A pump LOW PRESSURE lights are extinguished

Verify that the system A pressure is 2800 psi minimum.

Engine Start Procedure

Select the secondary engine indications. F/O

Air conditioning PACK switches ..... OFF F/O

Start sequence ..... Announce C

Call “START ___ ENGINE” C

ENGINE START switch ..... GRD F/O

Verify that the N2 RPM increases. C, F/O

When N1 rotation is seen and N2 is at 25%, or (if 25% N2 is not possible), at maximum motoring and a minimum of 20% N2:

Engine start lever ..... IDLE C

Monitor fuel flow and EGT indications. C, F/O

At 56% N2, verify that the ENGINE START switch moves to OFF. If not, move the ENGINE START switch to OFF. F/O

Verify that the START VALVE OPEN alert extinguishes when the ENGINE START switch moves to OFF. F/O

Call "STARTER CUTOUT." F/O

Monitor N1, N2, EGT, fuel flow and oil pressure for normal indications while the engine accelerates to a stable idle. C, F/O

After the engine is stable at idle, start the other engine.

Starter duty cycle:
- Do not exceed 2 minutes during each start attempt
- A minimum of 10 seconds is needed between start attempts

Normal engine start considerations:
- do not move an engine start lever to idle early or a hot start can occur
- keep a hand on the engine start lever while monitoring RPM, EGT and fuel flow until stable
- if fuel is shutoff accidentally (by closing the engine start lever) do not reopen the engine start lever in an attempt to restart the engine
- failure of the ENGINE START switch to stay in GRD until the starter cutout RPM can cause a hot start. Do not re–engage the ENGINE START switch until engine RPM is below 20% N2.

Do the ABORTED ENGINE START checklist for one or more of the following abort start conditions:
- the N1 or N2 does not increase or increases very slowly after the EGT increases
- there is no oil pressure indication by the time that the engine is stable at idle
- the EGT does not increase by 10 seconds after the engine start lever is moved to IDLE
- the EGT quickly nears or exceeds the start limit

Before Taxi Procedure

GENERATOR 1 and 2 switches	ON	F/O
PROBE HEAT switches	ON	F/O
WING ANTI–ICE switch	As needed	F/O
ENGINE ANTI–ICE switches	As needed	F/O
PACK switches	AUTO	F/O
ISOLATION VALVE switch	AUTO	F/O
APU BLEED air switch	OFF	F/O
APU switch	OFF	F/O
ENGINE START switches	CONT	F/O
Engine start levers	IDLE detent	C
Verify that the ground equipment is clear.		C, F/O
Call “FLAPS ___” as needed for takeoff.		C
Flap lever	Set takeoff flaps	F/O

Verify that the LE FLAPS EXT green light is illuminated.

Flight controls	Check	C

Move the control wheel and the control column to full travel in both directions and verify:

- freedom of movement
- that the controls return to center

Hold the nose wheel steering wheel during the rudder check to prevent nose wheel movement.

Move the rudder pedals to full travel in both directions and verify:

- freedom of movement
- that the rudder pedals return to center

Blank the lower display unit.		F/O
Transponder	As needed	F/O

At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting, but not a TCAS mode.

Recall .....Check C, F/O

Verify that all system annunciator panel lights illuminate and then extinguish.

Update changes to the taxi briefing, as needed. C or PF

Call “BEFORE TAXI CHECKLIST.” C

Do the BEFORE TAXI checklist. F/O

Before Takeoff Procedure [AD 2002-19-52 and AD 2002-24-51]

Pilot Flying	Pilot Monitoring
	Check the center tank fuel quantity. Both center tank fuel pump switches must be OFF for takeoff if center tank fuel is less than 2300 kilograms. Do not accomplish the CONFIG non-normal checklist with less than 2300 kilograms in the center tank prior to takeoff.
	Notify the cabin crew to prepare for takeoff. Verify that the cabin is secure.
The pilot who will do the takeoff updates changes to the takeoff briefing as needed.	
Set the weather radar display as needed. Set the terrain display as needed.	
Call “BEFORE TAKEOFF CHECKLIST.”	Do the BEFORE TAKEOFF checklist.

Before Takeoff Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51]

Pilot Flying	Pilot Monitoring
	Check the center tank fuel quantity. Both center tank fuel pump switches must be OFF for takeoff if center tank fuel is less than 2300 kilograms. Do not accomplish the CONFIG non-normal checklist with less than 2300 kilograms in the center tank prior to takeoff.
	Notify the cabin crew to prepare for takeoff. Verify that the cabin is secure.
The pilot who will do the takeoff updates changes to the takeoff briefing as needed.	
Set the weather radar display as needed. Set the terrain display as needed.	
Call “BEFORE TAKEOFF CHECKLIST.”	Do the BEFORE TAKEOFF checklist.

Before Takeoff Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51 for Airplanes with Master Caution System Logic Change and Automatic Shutoff]

Pilot Flying	Pilot Monitoring
	Notify the cabin crew to prepare for takeoff. Verify that the cabin is secure.
The pilot who will do the takeoff updates changes to the takeoff briefing as needed.	
Set the weather radar display as needed. Set the terrain display as needed.	
Call “BEFORE TAKEOFF CHECKLIST.”	Do the BEFORE TAKEOFF checklist.

Takeoff Procedure

Pilot Flying	Pilot Monitoring
	Enter the runway offset on the CDU TAKEOFF REF page.
	When entering the departure runway, set the STROBE light switch to ON. Use other lights as needed.
Verify that the brakes are released. Align the airplane with the runway.	When cleared for takeoff, set the FIXED LANDING light switches to ON. Set the transponder mode selector to TA/RA.
Advance the thrust levers to approximately 40% N1. Allow the engines to stabilize.	
Push the TO/GA switch.	
Verify that the correct takeoff thrust is set.	
	Monitor the engine instruments during the takeoff. Call out any abnormal indications. Adjust takeoff thrust before 60 knots as needed. During strong headwinds, if the thrust levers do not advance to the planned takeoff thrust by 60 knots, manually advance the thrust levers.
After takeoff thrust is set, the captain's hand must be on the thrust levers until V1.	
Monitor airspeed. Maintain light forward pressure on the control column.	Monitor airspeed and call out any abnormal indications.
Verify 80 knots and call "CHECK."	Call "80 KNOTS."
Verify V1 speed.	Call "V1."
At VR, rotate toward 15° pitch attitude. After liftoff, follow F/D commands. Establish a positive rate of climb.	At VR call "ROTATE." Monitor airspeed and vertical speed.

Pilot Flying	Pilot Monitoring
Verify a positive rate of climb on the altimeter and call "GEAR UP."	Verify a positive rate of climb on the altimeter and call "POSITIVE RATE." Set the landing gear lever to UP.
Above 400 feet radio altitude, call for a roll mode as needed.	Select or verify the roll mode.
At thrust reduction height verify that climb thrust is set.	
At acceleration height, call "SET FLAPS UP SPEED."	Set the flaps up maneuvering speed.
Verify acceleration. Call "FLAPS ___" according to the flap retraction schedule.	Set the FLAP lever as directed. Monitor flaps and slats retraction.
After flaps and slats retraction is complete, call "VNAV."	Push the VNAV switch.
Engage the autopilot after a roll mode and VNAV are engaged.	
	After flap retraction is complete: • Set or verify engine bleeds and air conditioning packs are operating • Set the engine start switches as needed • Set the AUTO BRAKE selector to OFF • Set the landing gear lever to OFF after landing gear retraction is complete
Call "AFTER TAKEOFF CHECKLIST."	Do the AFTER TAKEOFF checklist.

CAUTION: Do not allow the shoulder harness straps to retract quickly. Buckles can pull or damage circuit breakers.

Takeoff Flap Retraction Speed Schedule

Takeoff Flaps	At Speed (display)	Select Flaps
25	V2 + 15 “15” “5” “1”	15 5 1 UP
15 or 10	V2 + 15 “5” “1”	5 1 UP
5	V2 + 15 “1”	1 UP
1	“1”	UP
Limit bank angle to 15° until reaching V2 + 15		

Climb and Cruise Procedure [AD 2002-19-52 and AD 2002-24-51]

Complete the After Takeoff Checklist before starting the Climb and Cruise Procedure.

Pilot Flying	Pilot Monitoring
	If the center tank fuel pump switches were OFF for takeoff and the center tank contains more than 500 kilograms, position both center tank fuel pump switches ON above 10,000 feet or after the pitch attitude has been reduced to begin acceleration to a climb speed of 250 knots or greater.
	During climb, position both center tank fuel pump switches OFF when center tank fuel quantity reaches approximately 500 kilograms.
	At or above 10,000 feet MSL, set the LANDING light switches to OFF.
	Set the passenger signs as needed.
At transition altitude, set and crosscheck the altimeters to standard.	
	When established in a level attitude at cruise, if the center tank contains more than 500 kilograms and the center tank fuel pump switches are OFF, position the center tank fuel pump switches ON again. Position both center tank fuel pump switches OFF when center tank fuel quantity reaches approximately 500 kilograms.
	During the last hour of cruise on all ETOPS flights, do a Fuel Crossfeed Valve check.
	Before the top of descent, modify the active route as needed for the arrival and approach.

Climb and Cruise Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51]

Complete the After Takeoff Checklist before starting the Climb and Cruise Procedure.

Pilot Flying	Pilot Monitoring
	If the center tank fuel pump switches were OFF for takeoff and the center tank contains more than 950 kilograms, position both center tank fuel pump switches ON above 10,000 feet or after the pitch attitude has been reduced to begin acceleration to a climb speed of 250 knots or greater.
	At or above 10,000 feet MSL, set the LANDING light switches to OFF.
	Set the passenger signs as needed.
At transition altitude, set and crosscheck the altimeters to standard.	
	During climb or cruise, position one center tank fuel pump switch OFF when center tank fuel quantity reaches approximately 950 kilograms. Open the crossfeed valve to minimize fuel imbalance. Position the remaining center tank fuel pump switch OFF without delay and close the crossfeed valve when the Master Caution and FUEL system annunciator illuminate.
	During the last hour of cruise on all ETOPS flights, do a Fuel Crossfeed Valve check.
	Before the top of descent, modify the active route as needed for the arrival and approach.

Climb and Cruise Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51 for Airplanes with Master Caution System Logic Change and Automatic Shutoff]

Complete the After Takeoff Checklist before starting the Climb and Cruise Procedure.

Pilot Flying	Pilot Monitoring
	At or above 10,000 feet MSL, set the LANDING light switches to OFF.
	Set the passenger signs as needed.
At transition altitude, set and crosscheck the altimeters to standard.	
	During climb, position both center tank fuel pump switches OFF when one center tank fuel pump LOW PRESSURE light illuminates.
	When established in a level attitude at cruise, if the center tank contains usable fuel and the center tank fuel pump switches are OFF, position the center tank fuel pump switches ON again. Position both center tank fuel pump switches OFF when the center tank is empty.
	During the last hour of cruise on all ETOPS flights, do a Fuel Crossfeed Valve check.
	Before the top of descent, modify the active route as needed for the arrival and approach.

Descent Procedure [AD 2002-19-52 and AD 2002-24-51]

Start the Descent Procedure before the airplane descends below the cruise altitude for arrival at destination.

Complete the Descent Procedure by 10,000 feet MSL.

Pilot Flying	Pilot Monitoring
	During descent, position both center tank fuel pump switches OFF when center tank fuel quantity reaches approximately 1400 kilograms. Do not accomplish the CONFIG non-normal checklist.
	Verify that pressurization is set to landing altitude.
Review the system annunciator lights.	Recall and review the system annunciator lights.
Verify VREF on the APPROACH REF page.	Enter VREF on the APPROACH REF page.
Set the RADIO/BARO minimums as needed for the approach.	
Set or verify the navigation radios and course for the approach.	
	Set the AUTO BRAKE selector to the needed brake setting
Do the approach briefing.	
Call “DESCENT CHECKLIST.”	Do the DESCENT checklist.

Descent Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51]

Start the Descent Procedure before the airplane descends below the cruise altitude for arrival at destination.

Complete the Descent Procedure by 10,000 feet MSL.

Pilot Flying	Pilot Monitoring
	During descent, position one center tank fuel pump switch OFF when center tank fuel quantity reaches approximately 1400 kilograms. Open the crossfeed valve to minimize fuel imbalance. Turn the remaining center tank fuel pump switch OFF without delay and close the crossfeed valve when the Master Caution and FUEL system annunciator illuminate.
	If established in level flight for an extended period of time prior to approach and landing with more than 950 kilograms in the center tank and the center tank fuel pump switches OFF, one center tank fuel pump switch may be turned ON again. Open the crossfeed valve to minimize fuel imbalance. Turn the remaining center tank fuel pump switch OFF without delay and close the crossfeed valve when the Master Caution and FUEL system annunciator illuminate.
	Verify that pressurization is set to landing altitude.
Review the system annunciator lights.	Recall and review the system annunciator lights.
Verify VREF on the APPROACH REF page.	Enter VREF on the APPROACH REF page.
Set the RADIO/BARO minimums as needed for the approach.	

Pilot Flying	Pilot Monitoring
Set or verify the navigation radios and course for the approach.	
	Set the AUTO BRAKE selector to the needed brake setting
Do the approach briefing.	
Call “DESCENT CHECKLIST.”	Do the DESCENT checklist.

Descent Procedure [Alternate Method of Compliance (AMOC) to AD 2002-24-51 for Airplanes with Master Caution System Logic Change and Automatic Shutoff]

Start the Descent Procedure before the airplane descends below the cruise altitude for arrival at destination.

Complete the Descent Procedure by 10,000 feet MSL.

Pilot Flying	Pilot Monitoring
	During descent, position both center tank fuel pump switches OFF when one center tank fuel LOW PRESSURE light illuminates.
	If established in level flight for an extended period of time with usable fuel in the center tank and the center tank fuel pump switches OFF, the center tank fuel pump switches may be positioned ON again. Position both center tank fuel pump switches OFF when the center tank is empty.
	Verify that pressurization is set to landing altitude.
Review the system annunciator lights.	Recall and review the system annunciator lights.
Verify VREF on the APPROACH REF page.	Enter VREF on the APPROACH REF page.
Set the RADIO/BARO minimums as needed for the approach.	
Set or verify the navigation radios and course for the approach.	
	Set the AUTO BRAKE selector to the needed brake setting
Do the approach briefing.	
Call “DESCENT CHECKLIST.”	Do the DESCENT checklist.

Approach Procedure

The Approach Procedure is normally started at transition level.

Complete the Approach Procedure before:

- the initial approach fix, or
- the start of radar vectors to the final approach course, or
- the start of a visual approach

For a BCRS approach, enter the front course in the Mode Control Panel COURSE window. Do not select VOR/LOC.

Pilot Flying	Pilot Monitoring
	Set the passenger signs as needed.
	At or above 10,000 feet MSL, set the FIXED LANDING light switches to ON.
At transition level, set and crosscheck the altimeters.	
Update changes to the arrival and approach, as needed.	
Update the approach briefing as needed.	
Call "APPROACH CHECKLIST."	Do the APPROACH checklist.

Flap Extension Schedule

Current Flap Position	At Speedtape "Display"	Select Flaps	Command Speed for Selected Flaps
UP	"UP"	1	"1"
1	"1"	5	"5"
5	"5"	15	"15"
15	"15"	30 or 40	(VREF30 or VREF40) + wind additives

Landing Procedure

Pilot Flying	Pilot Monitoring
	Notify the cabin crew to prepare for landing. Verify that the cabin is secure.
Call “FLAPS ___” according to the flap extension schedule.	Set the flap lever as directed. Monitor flaps and slats extension.
When on localizer intercept heading: • verify that the ILS is tuned and identified • verify that the LOC and G/S pointers are shown	
Arm the APP mode. Engage the other autopilot.	
Use HDG SEL to intercept the final approach course as needed.	
Verify that the localizer is captured.	
	Call “GLIDE SLOPE ALIVE.”
At glide slope alive, call: • “GEAR DOWN” • “FLAPS 15”	Set the landing gear lever to DN. Verify that the green landing gear indicator lights are illuminated. Set the flap lever to 15. Set the engine start switches to CONT.
Set the speed brake lever to ARM. Verify that the SPEED BRAKE ARMED light is illuminated.	
At glide slope capture, call “FLAPS ___” as needed for landing.	Set the flap lever as directed.
Set the missed approach altitude on the MCP.	
Call “LANDING CHECKLIST.”	Do the LANDING checklist.
At the final approach fix or OM, verify the crossing altitude.	
Monitor the approach. Verify the AFDS status at 500 feet radio altitude.	

Go–Around and Missed Approach Procedure

Pilot Flying	Pilot Monitoring
At the same time: • push the TO/GA switch • call “FLAPS 15.”	Position the FLAP lever to 15 and monitor flap retraction
Verify: • the rotation to go–around attitude • that the thrust increases.	
	Verify that the thrust is sufficient for the go-around or adjust as needed.
Verify a positive rate of climb on the altimeter and call “GEAR UP.”	Verify a positive rate of climb on the altimeter and call “POSITIVE RATE.” Set the landing gear lever to UP.
	Verify that the missed approach altitude is set.
Above 400 feet, select appropriate roll mode and verify proper mode annunciation.	Observe mode annunciation.
Verify that the missed approach route is tracked.	
At acceleration height, call “FLAPS ___” according to the flap retraction schedule.	Set the FLAP lever as directed. Monitor flaps and slats retraction.
After flap retraction to the planned flap setting, select LVL CHG. VNAV may be selected if the flaps are up.	
Verify that climb thrust is set.	
Verify that the missed approach altitude is captured.	
	Set the landing gear lever to OFF after landing gear retraction is complete. Set the engine start switches as needed.
Call “AFTER TAKEOFF CHECKLIST.”	Do the AFTER TAKEOFF checklist.

Landing Roll Procedure

Pilot Flying	Pilot Monitoring
Disengage the autopilot. Control the airplane manually.	
Verify that the thrust levers are closed. Verify that the SPEED BRAKE lever is UP.	Verify that the SPEED BRAKE lever is UP. Call "SPEED BRAKES UP." If the SPEED BRAKE lever is not UP, call "SPEED BRAKES NOT UP."
Verify correct auto brake operation.	
WARNING: After the reverse thrust levers are moved, a full stop landing must be made. If an engine stays in reverse, safe flight is not possible.	
Without delay, move the reverse thrust levers to the interlocks and hold light pressure until the interlocks release. Then apply reverse thrust as needed.	
By 60 knots, start movement of the reverse thrust levers to be at the reverse idle detent before taxi speed.	Call "60 KNOTS."
After the engines are at reverse idle, move the reverse thrust levers full down.	
Before taxi speed, disarm the auto brakes. Use manual braking as needed.	

After Landing Procedure

Start the After Landing Procedure when clear of the active runway.

Pilot Flying	Pilot Monitoring
The captain moves or verifies that the SPEED BRAKE lever is DOWN.	
	Start the APU.
	Set the PROBE HEAT switches to OFF.
	Set the LANDING, TAXI, and STROBE light switches as needed.
	Set the ENGINE START switches to OFF.

Pilot Flying	Pilot Monitoring
Set the weather radar to OFF.	
	Set the AUTO BRAKE selector to OFF.
	Set the flap lever to UP.
	Set the transponder mode selector as needed. At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting, but not a TCAS mode.

Shutdown Procedure

Start the Shutdown Procedure after taxi is complete.

Parking brake ..... Set C

Verify that the parking brake warning light is illuminated.

Electrical power ..... Set F/O

If APU power is needed:

Verify that the APU GENERATOR OFF BUS light is illuminated.

APU GENERATOR bus switches – ON

Verify that the SOURCE OFF lights are extinguished.

If external power is needed:

Verify that the GRD POWER AVAILABLE light is illuminated.

GRD POWER switch – ON

Verify that the SOURCE OFF lights are extinguished.

Engine start levers ..... CUTOFF C

If possible, after high thrust operation, including reverse thrust, run the engines at or near idle for three minutes before shutdown to cool the engine hot sections. Time at or near idle, such as taxiing before shutdown, is applicable to this three minute period. If needed, the engines may be shut down with a one minute cooling period. Routine cool down times of less than three minutes before shutdown are not recommended.

If towing is needed:

Establish communications with ground handling personnel. C

WARNING: If the nose gear steering lockout pin is not installed and hydraulic system A is pressurized, any change to electrical or hydraulic power with the tow bar connected may cause unwanted tow bar movement.

Verify that the nose gear steering lockout pin is installed, or, if the nose gear steering lockout pin is not used. C

System A HYDRAULIC PUMP switches – OFF

Verify that the system A pump LOW PRESSURE lights are illuminated.

CAUTION: Do not hold or turn the nose wheel steering wheel during pushback or towing. This can damage the nose gear or the tow bar.

CAUTION: Do not use airplane brakes to stop the airplane during pushback or towing. This can damage the nose gear or the tow bar.

Set or release the parking brake as directed by ground handling personnel. C

FASTEN BELTS switch ..... OFF F/O

ANTI COLLISION light switch ..... OFF F/O

FUEL PUMP switches ..... OFF F/O

CAUTION: Do not use the center tank fuel pumps with the flight deck unattended.

G-EZJO - G-EZKG
CAB/UTIL power switch ..... As needed F/O

G-EZJO - G-EZKG
IFE/PASS SEAT power switch ..... As needed F/O

G-EZJA - G-EZJN
GALLEY power switch ..... As needed F/O

WING ANTI–ICE switch ..... OFF F/O

ENGINE ANTI–ICE switches ..... OFF F/O

ELECTRIC HYDRAULIC PUMP switches ..... OFF F/O

RECIRCULATION FAN switch ..... As needed F/O

Air conditioning PACK switches ..... AUTO F/O

ISOLATION VALVE switch ..... OPEN F/O

Engine BLEED air switches ..... ON F/O

APU BLEED air switch ..... ON F/O

Exterior lights switches	As needed	F/O
FLIGHT DIRECTOR switches	OFF	C, F/O
After the wheel chocks are in place:		
Parking brake – Release.		C
APU switch	As needed	F/O
Call “SHUTDOWN CHECKLIST.”		C
Do the SHUTDOWN checklist.		F/O

Secure Procedure

IRS mode selectors	OFF	F/O
EMERGENCY EXIT LIGHTS switch	OFF	F/O
WINDOW HEAT switches	OFF	F/O
Air conditioning PACK switches	OFF	F/O
Call “SECURE CHECKLIST.”		C
Do the SECURE checklist.		F/O

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General

This section contains procedures (adverse weather operation, engine crossbleed start, and so on) that are accomplished as required rather than routinely performed on each flight.

Supplementary procedures may be required because of adverse weather, unscheduled maintenance or as a result of a procedure referenced in a Non–Normal Checklist. Additionally, some may be performed if the flight crew must accomplish preflight actions normally performed by maintenance personnel.

At the discretion of the Captain, procedures may be performed by recall, by reviewing the procedure prior to accomplishment, or by reference to the procedure during its accomplishment.

Supplementary procedures are provided by section. Section titles correspond to the respective chapter title for the system being addressed except for the adverse weather section.

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Interior Inspection

Emergency exit lights ..... Check

Passenger signs ..... Check

Service and entry doors ..... Check

Escape slides ..... Check pressure

Emergency exits ..... Check

Wing upper surfaces ..... Check

Lavatory fire extinguishers ..... Check

Emergency equipment ..... Check

Check availability and condition of emergency equipment, as required.

Water System Draining

Lavatory water supply selector valves ..... SUPPLY/DRAIN

Galley water supply shutoff valves ..... SUPPLY ON

The shutoff valve is found adjacent to each wet galley sink.

Drain line ..... Connect to drain ports

There are two drain port locations:

- below the main passenger entry door
- aft of the water service panel

Water service panel ..... Open

Tank drain valve handle ..... OPEN

Drains potable water tank and water system aft of the wings.

Forward lavatory drain valve ..... OPEN

Drain valve is found below the sink in the forward lavatory only.

Drain valves for coffee maker and water boiler (if installed) ..... OPEN

All galley and lavatory water faucets ..... Open

Close faucets when water flow stops.

Accomplish the following items after verifying the potable water system is empty:

Drain valves for coffee maker and water boiler (if installed) ..... CLOSED

Forward lavatory drain valve ..... CLOSED

Tank drain valve handle ..... CLOSED

Water service panel ..... Close

Drain line ..... Disconnect from drain ports

If the potable water tank will not be refilled immediately after the system is emptied, open the following circuit breakers and attach DO–NOT–CLOSE tags:

P18–3 circuit breaker panel
- LAVATORY WATER HEATER A
- LAVATORY WATER HEATER D
- LAVATORY WATER HEATER E

Power distribution panel number 1
- POT WATER COMPRESSOR
- WATER QTY IND

Forward Airstair Operation

WARNING: Use care not to fall from the airstair platform when operating the forward entry door. The small platform area and bad weather can make the door difficult to operate.

CAUTION: Operation of airstair in winds exceeding 40 knots is not recommended.

CAUTION: Do not move airplane with stair extended.

Interior Control

WARNING: Open entry door to cocked position to allow clear visibility of area outside airplane to prevent injury to personnel. Do not open door beyond cocked position while operating airstair.

To extend:

Forward entry door .....Open to cocked position

When operating the airstair from the interior control panel, the forward entry door must be open to the cocked position. Safety circuits prevent airstair operation if the entry door is closed.

Control switch .....EXTEND

Note: For interior standby operation, the battery switch must be ON.

Hold until extension is complete.

The STAIRS OPER light illuminates during extension until the airstair is fully extended.

Note: The STAIRS OPER light will not illuminate with loss of AC power.

Control switch ..... Release

Handrail extensions .....Engage

Release latch and pull inboard and up, extend and engage on the supports at the sides of the forward entry doorway.

To Retract:

Handrail extensions ..... Disengage

Disengage from door supports, depress latch at base of forward extension to permit retraction within upper segment of handrail. Slide right and left extensions down along upper rails. Stowing in appropriate stowage points provides circuit continuity for energizing retract relay.

CAUTION: Use of the standby control switch bypasses all safety circuits. Airstair handrail extensions must be stowed or substantial damage could result.

Control switch ..... RETRACT

Hold until retraction is complete.

The STAIRS OPER light illuminates during retraction until the airstair door is fully closed.

Note: The STAIRS OPER light will not illuminate with loss of AC power.

Control switch ..... Release

Exterior Control

To Extend:

Normal mode:

AIRSTAIRS switch ..... EXTEND

Standby mode:

POWER switch ..... Hold in STANDBY

AIRSTAIRS switch ..... EXTEND

Forward entry door ..... Open to cocked position

WARNING: Extend and connect the airstair aft handrail to protect against falling and prevent injuries to personnel.

Aft handrail extension ..... Engage

Release latch and pull inboard and up, extend and engage on the support at the side of the forward entry door.

WARNING: Step down the airstair as the forward entry door moves to the open position to prevent injuries to personnel.

Forward entry door ..... Fully open

Forward handrail extension ..... Engage

Release latch and pull inboard and up, extend and engage on the support at the side of the forward entry door.

To Retract:

WARNING: Do not disengage the airstair aft handrail at this time. Injuries to personnel can occur during forward entry door operations if the aft handrail is disengaged.

Forward handrail extension ..... Disengage

Disengage from door support, depress latch at base of forward extension to permit retraction within upper segment of handrail. Slide right and left extensions down along upper rails. Stowing in appropriate stowage points provides circuit continuity for energizing retract relay.

WARNING: Step down the airstair as the forward entry door moves to the cocked position to prevent injuries to personnel.

Forward entry door ..... Close to cocked position

Aft handrail extension ..... Disengage

Disengage from door support, depress latch at base of forward extension to permit retraction within upper segment of handrail. Slide right and left extensions down along upper rails. Stowing in appropriate stowage points provides circuit continuity for energizing retract relay.

Forward entry door ..... Fully close

CAUTION: Use of the standby control switch bypasses all safety circuits. Airstair handrail extension must be stowed or substantial damage could result.

Normal mode:

AIRSTAIRS switch ..... RETRACT

Standby mode:

POWER switch ..... Hold in STANDBY

AIRSTAIRS switch ..... RETRACT

Oxygen Mask Microphone Test

MASK-BOOM switch ..... MASK

RESET/TEST ..... Push and hold

EMERGENCY/TEST selector ..... Push and hold

FLT INT ..... Push

Verify oxygen flow sound is heard through the flight deck loudspeaker.

Push-to-Talk switch ..... I/C

Simultaneously push the Push-to-Talk switch, EMERGENCY/TEST selector and the RESET/TEST switch.

Verify oxygen flow sound is heard through the flight deck loudspeaker.

Push-to-Talk switch ..... Release

EMERGENCY/TEST selector ..... Release

RESET/TEST ..... Release

MASK-BOOM switch ..... BOOM

Wing–Body Overheat Test

Wing–body OVHT TEST switch ..... Push

Hold for a minimum of 5 seconds.

Both WING–BODY OVERHEAT lights – illuminated

MASTER CAUTION – illuminated

AIR COND system annunciator – illuminated

Wing–body OVHT TEST switch ..... Release

Both WING–BODY OVERHEAT lights – extinguished

MASTER CAUTION lights – extinguished

AIR COND system annunciator – extinguished

External Air Cart Use

CAUTION: The BAT switch should always be on when using the airplane air conditioning system since the protective circuits are DC. This ensures protection in the event of loss of AC power.

Note: For engine start with a ground air source, see section SP.7.

APU BLEED air switch ..... OFF

ISOLATION VALVE switch ..... OPEN

RECIRC FAN switch .....AUTO

PACK switches ..... AUTO or HIGH

Cabin temperature selectors .....AUTO

Set for desired temperature.

Duct pressure ..... 20 psi minimum

If external air cannot hold 20 psi minimum and the APU is operating:

ISOLATION VALVE switch .....AUTO

APU BLEED air switch ..... ON

APU supplies left pack and external air source supplies right pack.

Ground Air Conditioning Cart Use

Before connecting ground air conditioning cart:

PACK switches ..... OFF

Allows cart to operate at maximum efficiency

After disconnecting ground air conditioning cart:

PACK switches ..... As required

Isolated Pack Operation during Engine Start

To improve cabin air quality between starting the first and second engine:

CAUTION: Moving engine BLEED air switches while a starter is engaged can damage the starter.

Engine No. 2 ..... Start

After engine No. 2 stabilized:

ISOLATION VALVE switch ..... CLOSE

Right PACK switch ..... AUTO

Duct pressure ..... Stabilized

Engine No. 1 ..... Start

After engine No. 1 stabilized:

ISOLATION VALVE switch ..... AUTO

Pressurization System Manual Mode Test

PACK switches ..... OFF

Pressurization mode selector ..... MAN

AUTO FAIL and ALTN lights – extinguished.

MANUAL light – illuminated.

Outflow valve switch ..... CLOSE

Verify outflow valve position indicator moves toward CLOSE.

Outflow valve switch ..... OPEN

Verify outflow valve position indicator moves toward OPEN.

Pressurization mode selector .....AUTO

Verify outflow valve position indicator moves toward OPEN.

MANUAL light – extinguished.

Manual Mode Operation

CAUTION: Switch actuation to the manual mode causes an immediate response by the outflow valve. Full range of motion of the outflow valve can take up to 20 seconds.

Pressurization mode selector ..... MAN

MANUAL light – illuminated

CABIN/FLIGHT ALTITUDE placard ..... Check

Determine the desired cabin altitude.

If a higher cabin altitude is desired:

Outflow valve switch (momentarily) ..... OPEN

Verify the outflow valve position indicator moves right, cabin altitude climbs at the desired rate, and differential pressure decreases. Repeat as necessary.

If a lower cabin altitude is desired:

Outflow valve switch (momentarily) ..... CLOSE

Verify the outflow valve position indicator moves left, cabin altitude descends at the desired rate, and differential pressure increases. Repeat as necessary.

During Descent

Thrust lever changes should be made as slowly as possible to prevent excessive pressure bumps.

Outflow valve switch (momentarily) ..... CLOSE

During descent, intermittently position the outflow valve switch toward CLOSE, observing cabin altitude decrease as the airplane descends.

Before entering the landing pattern, slowly position the outflow valve to full open to depressurize the airplane. Verify differential pressure is zero.

Pressurization Control Operation – Landing at Alternate Airport

At top of descent:

LAND ALT Indicator ..... Reset

Reset to new destination field elevation.

Automatic Pressurization Control – Departure Airport Elevation Above 9500 Feet

Oxygen masks and regulators ..... ON, Normal

Supplemental oxygen must be used when operating the airplane anytime the cabin altitude is above 10,000 feet.

After electrical power is applied to the airplane:

ALT HORN CUTOUT switch ..... Push

Monitor CABIN altitude and CABIN rate of CLIMB indicators during climbout to ensure cabin altitude is descending below 8500 feet. No cabin altitude warning is provided until the cabin altitude warning system is reset to 10,000 feet after the cabin altitude descends below 8500 feet.

If landing altitude is at or below 6000 feet:

LAND ALT indicator .....Destination field elevation

If landing altitude is above 6000 feet:

Do the Automatic Pressurization Control - Landing Airport Elevation Above 6000 Feet supplementary procedure.

Automatic Pressurization Control – Landing Airport Elevation Above 6000 Feet

If flight is less than one hour:

Accomplish normal procedures.

If flight is more than one hour:

Accomplish normal procedures except as modified below.

Prior to takeoff:

LAND ALT indicator ..... 6000 feet

At initial descent or approximately 20 minutes prior to landing:

LAND ALT indicator ..... Destination field elevation

Unpressurized Takeoff and Landing

When making a no engine bleed takeoff or landing with the APU inoperative:

Takeoff

PACK switches ..... AUTO

ISOLATION VALVE switch ..... CLOSE

Engine BLEED air switches ..... OFF

After Takeoff

Note: If engine failure occurs, do not position engine BLEED air switches ON until reaching 1500 feet or until obstacle clearance height has been attained.

At not less than 400 feet, and prior to 2000 feet above field elevation:

Engine No. 2 BLEED air switch ..... ON

When CABIN rate of CLIMB indicator stabilizes:

Engine No. 1 BLEED air switch ..... ON

ISOLATION VALVE switch ..... AUTO

Landing

When below 10,000 feet and starting final approach turn:

Engine BLEED air switches ..... OFF

Avoid high rates of descent for passenger comfort.

No Engine Bleed Takeoff and Landing

When making a no engine bleed takeoff or landing with the APU operating.

Takeoff

Note: If anti–ice is required for taxi, configure for a "No Engine Bleed Takeoff" just prior to take–off.

Note: If anti–ice is not required for taxi, configure for a "No Engine Bleed Takeoff" just after engine start.

Right PACK switch ..... AUTO

ISOLATION VALVE switch ..... CLOSE

Left PACK switch ..... AUTO

Engine No. 1 BLEED air switch ..... OFF

APU BLEED air switch ..... ON

Engine No. 2 BLEED air switch ..... OFF

WING ANTI-ICE switch ..... OFF

The WING ANTI-ICE switch must remain OFF until the engine BLEED air switches are repositioned to ON and the ISOLATION VALVE switch is repositioned to AUTO.

After Takeoff

Note: If engine failure occurs, do not position engine BLEED air switches ON until reaching 1500 feet or until obstacle clearance height has been attained.

Engine No. 2 BLEED air switch ..... ON

APU BLEED air switch ..... OFF

When CABIN rate of CLIMB indicator stabilizes:

Engine No. 1 BLEED air switch ..... ON

ISOLATION VALVE switch ..... AUTO

Landing

If additional go–around thrust is desired, configure for a “No Engine Bleed Landing.”

When below 10,000 feet:

WING ANTI-ICE switch ..... OFF

Right PACK switch ..... AUTO

ISOLATION VALVE switch ..... CLOSE

Left PACK switch ..... AUTO

Engine No. 1 BLEED air switch ..... OFF

APU BLEED air switch ..... ON

Engine No. 2 BLEED air switch ..... OFF

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Anti–Ice Operation

Requirements for use of anti–ice and operational procedures for engine and wing anti–ice are contained in Supplementary Procedures, Adverse Weather Section SP.16.

Cold-Soaked Fuel Frost

Frost may form on the lower and upper wing surfaces due to cold-soaked fuel touching the wing surface after long flights with large fuel loads.

Exterior Safety Inspection - Airplanes with Defined Cold-Soaked Fuel Frost Area

Note: The presence of the painted cold soaked fuel frost area on the upper wing and the inclusion of these procedures in the FCOM do not constitute operational approval. Operators may be allowed to use these procedures by referring to the appropriate regulatory authority for approval or exemption, as required, to implement the procedure.

Surfaces ..... Check

Visually inspect the lower and upper wing surfaces.

If there is frost or ice on the lower surface outboard of measuring stick 4, there may also be frost or ice on the upper surface. The distance that the frost extends outboard of measuring stick 4 can be used as an indication of the extent of the frost on the upper surface.

Takeoff with light coatings of cold-soaked fuel frost, up to 1/8 inch (3 mm) in thickness on lower wing surfaces is allowable; however, all leading edge devices, all control surfaces, tab surfaces and balance panel cavities must be free of snow, frost or ice. If the frost on the lower surface is greater than 1/8 inch (3 mm) in thickness, all ice or frost on the wings must be removed using appropriate deicing/anti-icing procedures.

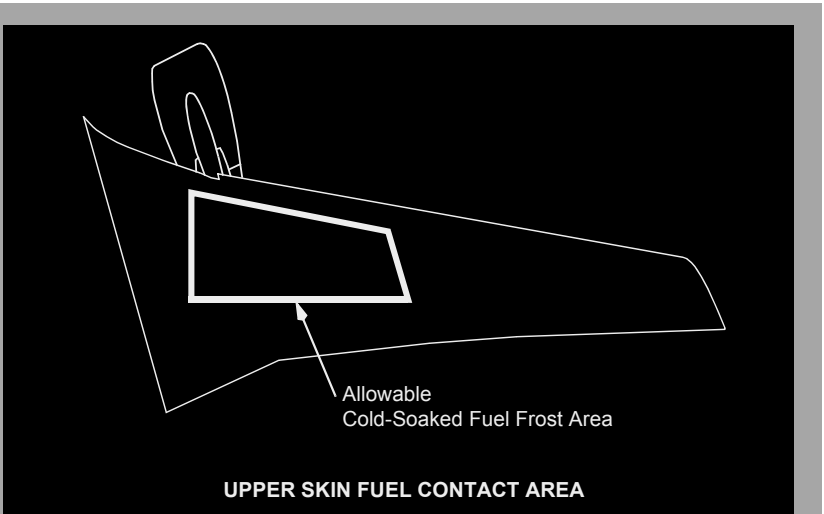
Takeoff with light coatings of cold-soaked fuel frost on upper wing surfaces is allowable, provided the following conditions are met:

- the frost on the upper surface is less than 1/16 inch (1.5 mm) in thickness

- the extent of the frost is similar on both wings
- the frost is on or between the black lines defining the allowable cold-soaked fuel frost area (see figure) with no ice or frost on the leading edges or control surfaces
- the ambient air temperature is above freezing (0°C, 32°F)
- there is no precipitation or visible moisture (rain, snow, drizzle or fog with less than 1 mile visibility, etc.)

If all the above criteria are not met, all ice or frost on the wings must be removed using appropriate deicing/anti-icing procedures.

Note: If the frost on the lower surface is less than 1/16 inch (1.5 mm) in thickness, the frost on the upper surface will be less than 1/16 inch (1.5 mm) in thickness.



Exterior Safety Inspection - Airplanes without Defined Cold-Soaked Fuel Frost Area

Surfaces ..... Check

Visually inspect the lower and upper wing surfaces.

If there is frost or ice on the lower surface outboard of measuring stick 4, there may also be frost or ice on the upper surface. The distance that the frost extends outboard of measuring stick 4 can be used as an indication of the extent of the frost on the upper surface.

Takeoff with light coatings of cold-soaked fuel frost, up to 1/8 inch (3 mm) in thickness on lower wing surfaces is allowable; however, all leading edge devices, all control surfaces, tab surfaces and balance panel cavities must be free of snow, frost or ice. If the frost on the lower surface is greater than 1/8 inch (3 mm) in thickness, all ice or frost on the wings must be removed using appropriate deicing/anti-icing procedures.

Takeoff with cold-soaked fuel frost on upper wing surfaces is not allowable. If any frost is present on the upper wing surface, all ice or frost on the wings must be removed using appropriate deicing/anti-icing procedures.

Window Heat System Tests

Overheat Test

The overheat test simulates an overheat condition to check the overheat warning function of the window heat system.

WINDOW HEAT switches ..... ON

WINDOW HEAT TEST switch ..... OVHT

OVERHEAT lights – On

ON lights – Extinguish

Lights extinguish after approximately 1 minute.

MASTER CAUTION – On

ANTI–ICE system annunciator – On

WINDOW HEAT switches ..... Reset

Position the WINDOW HEAT switches OFF, then ON.

Power Test

The power test verifies operation of the window heat system. The test may be accomplished when any of the window heat ON lights are extinguished and the associated WINDOW HEAT switch is ON.

WINDOW HEAT switches ..... ON

Note: Do not perform the power test when all ON lights are illuminated

WINDOW HEAT TEST switch ..... PWR

The controller is forced to full power, bypassing normal temperature control. Overheat protection is still available.

WINDOW HEAT ON lights .....Illuminated

If any ON light remains extinguished, the window heat system is inoperative. Observe the maximum airspeed limit of 250 kts below 10,000 feet.

Level Change Climb/Descent

ALTITUDE selector ..... Set desired altitude

Note: If a new MCP altitude is selected while in ALT ACQ, the AFDS engages in V/S and the existing vertical speed is maintained.

LVL CHG switch ..... Push

Verify FMA display:

Thrust mode (climb) – N1

Thrust mode (descent) – RETARD then ARM

Pitch mode – MCP SPD

IAS/MACH Selector ..... Set desired speed

Vertical Speed (V/S) Climb/Descent

ALTITUDE selector ..... Set desired altitude

Note: If a new MCP altitude is selected while in ALT ACQ, the AFDS engages in V/S and the existing vertical speed is maintained.

V/S thumbwheel ..... Set desired vertical speed

Verify FMA display:

Thrust mode (climb or descent) – MCP SPD

Pitch mode – V/S

IAS/MACH Selector ..... Set desired speed

To transition to the vertical speed mode from another engaged climb or descent mode:

V/S mode switch ..... Push

V/S climb mode engages at existing V/S.

V/S thumbwheel ..... Set desired vertical speed

Verify FMA display:

Thrust mode (climb or descent) – MCP SPD

Pitch mode – V/S

IAS/MACH Selector ..... Set desired speed

Temporary Level-Off during Climb or Descent (Not at FMC Cruise Altitude)

MCP altitude selector .....Set desired altitude

MCP N1 light will extinguish if leveling from a climb.

N1 Limit changes to CRZ if leveling from a climb.

To continue climb/descent:

MCP altitude selector .....Set desired altitude

VNAV switch ..... Push

Observe climb or descent initiated. Mode annunciations appear as initial climb or descent.

Altitude Hold

Altitude HOLD switch ..... Push

Verify FMA display:

Pitch mode – ALT HOLD

Heading Select

Heading selector .....Set desired heading

Heading select switch ..... Push

Verify FMA display:

Roll mode – HDG SEL

VOR Navigation

VHF NAV radio(s) .....Tune and Identify

COURSE selector ..... Set desired course

When on an intercept heading to the VOR course:

VOR LOC mode switch ..... Push

Verify VOR LOC armed mode annunciates.

A/P automatically captures the VOR course.

Verify VOR LOC engaged mode annunciates upon course capture.

Note: If change to a localizer frequency is desired when captured in the VOR mode, disengage VOR LOC mode prior to selection of the localizer. VOR LOC mode can then be reengaged.

Instrument Approach using VNAV

Note: This procedure is not authorized using QFE.

Note: Operational approval required for the use of an MDA(H) as a DA(H). If required to remain at or above MDA(H) during the missed approach, a missed approach must be initiated at least 50 feet above MDA(H).

Recommended roll modes for final approach:

- RNAV, GPS or TACAN approach: LNAV
- LOC-BC, VOR or NDB approach: LNAV or HDG SEL
- LOC, SDF or LDA approach: VOR/LOC or LNAV.

For LOC, LOC-BC, SDF or LDA approaches, ensure appropriate navaids are tuned and identified prior to commencing the approach and monitor raw data throughout the approach. For VOR and NDB approaches, raw data should be monitored, if available.

FMC approach procedure ..... Select

Select the approach procedure on the ARRIVALS page. Do not manually build the approach or add waypoints to the selected FMC procedure. Add cold temperature corrections to waypoint altitude constraints as appropriate.

Verify VNAV glide path angle is displayed on the final approach segment of the LEGS page.

RNP appropriate for approach (if required) ..... Verify/Enter

[Allows appropriate alerting to occur if ANP exceeds RNP.]

Approximately 2 NM prior to the FAF and after ALT HLD or VNAV PTH is engaged:

MCP altitude ..... Set MDA(H)/DA(H)

[Allows VNAV to command descent in VNAV PTH. If the MDA(H)/DA(H) does not end in zero zero, for example, 1820, set MCP ALTITUDE window to the closest 100 foot increment above the constraint.]

Note: There may be a level segment beyond the FAF before intercepting the descent path.

Prior to reaching FAF:

AFDS roll mode ..... Verify/select

Verify appropriate roll mode annunciates.

VNAV switch (if required) ..... Push

Select VNAV if in ALT HLD. Verify VNAV PTH annunciates.

Autopilot ..... Verify engaged

[Autopilot should remain engaged until suitable visual reference is established.]

Prior to reaching MDA(H)/DA(H) and when the airplane is at least 300 feet below the missed approach altitude:

MCP altitude ..... Set missed approach altitude

At MDA(H)/DA(H)/Missed approach point:

If suitable visual reference is not established, execute a missed approach.

After suitable visual reference is established:

A/P disengage switch ..... Push

Disengage the autopilot before descending below MDA(H)/DA(H).

A/T disengage switch ..... Push

Disengage the autothrottle before descending below MDA(H)/DA(H).

Instrument Approach using Vertical Speed (V/S)

Note: Autopilot use is recommended until suitable visual reference is established.

Note: If required to remain at or above the MDA during the missed approach, the missed approach must be initiated at least 50 feet above MDA.

Recommended roll modes:

- RNAV, GPS, TACAN, LOC-BC, VOR or NDB approach: LNAV or HDG SEL.
- LOC, SDF or LDA approach: LOC or LNAV.

Ensure appropriate navaids (VOR, LOC or NDB) are tuned and identified prior to commencing approach.

RNP appropriate for approach (if required) ..... Verify/Enter

Allows appropriate alerting to occur if ANP exceeds RNP.

Before descent to MDA(H):

MCP altitude .....Set

Set the first intermediate altitude constraint or the MDA(H). When the current constraint is assured, the next constraint may be set prior to ALT HOLD is engaged to achieve continuous descent path.

If constraints or MDA(H) do not end in zero zero, for example, 1820, set MCP ALTITUDE window to the closest 100 foot increment above the constraint.

At descent point:

Desired V/S .....Set

Set desired V/S to descend to MDA(H). Use a V/S that results in no level flight segment at the MDA(H).

Verify V/S mode annunciates.

Approximately 300 feet above MDA(H):

MCP altitude .....Set missed approach altitude

At MDA(H)/missed approach point:

If suitable visual reference is not established, execute a missed approach.

After a suitable visual reference is established:

A/P disengage switch ..... Push

Disengage the autopilot before descending below MDA(H).

A/T disengage switch ..... Push

Disengage the autothrottle before descending below MDA(H).

Circling Approach

Note: Autopilot use is recommended until intercepting the landing profile.

MCP altitude selector ..... Set

If the MDA(H) does not end in zero zero, for example, 1820, set MCP ALTITUDE window to the closest 100 foot increment above the MDA(H).

Accomplish an instrument approach, establish suitable visual reference and level off at MCP altitude.

Verify ALT HLD mode annunciates.

MCP altitude selector ..... Set missed approach altitude

HDG SEL switch ..... Push

Verify HDG SEL mode annunciates.

Intercepting the landing profile:

Autopilot disengage switch ..... Push

Autothrottle disengage switch ..... Push

Cockpit Voice Recorder Test

Note: The Cockpit VOICE RECORDER switch must be in the ON position or at least one engine must be operating to perform this test.

Test switch ..... Push

After a slight delay:

Test light ..... ON

A tone may be heard through a headset plugged into the headset jack.

Test switch ..... Release

Intentionally
Blank

Electrical Power Up

The following procedure is accomplished to permit safe application of electrical power.

BATTERY switch ..... Guard closed

G-EZJU - G-EZJW

Note: Do not move the airplane until Integrated Standby Flight Display (ISFD) alignment is complete.

STANDBY POWER switch ..... Guard closed

ALTERNATE FLAPS master switch ..... Guard closed

Windshield WIPER selector(s) ..... PARK

ELECTRIC HYDRAULIC PUMPS switches ..... OFF

LANDING GEAR lever .....DN

Verify that the green landing gear indicator lights are illuminated.

Verify that the red landing gear indicator lights are extinguished.

If external power is needed:

Verify that the GRD POWER AVAILABLE light is illuminated.

GRD POWER switch – ON

Verify that the SOURCE OFF lights are extinguished.

Verify that the TRANSFER BUS OFF lights are extinguished.

Verify that the STANDBY PWR OFF light is extinguished.

If APU power is needed:

Verify that the engine No. 1, APU and the engine No. 2 fire switches are in.

Alert ground personnel before the following test is accomplished.

OVERHEAT DETECTOR switches – NORMAL

TEST switch – Hold to FAULT/INOP

Verify that the MASTER CAUTION lights are illuminated.

Verify that the OVHT/DET annunciator is illuminated.

Verify that the FAULT light is illuminated.

If the FAULT light fails to illuminate, the fault monitoring system is inoperative.

Verify that the APU DET INOP light is illuminated.

Do not operate the APU if the APU DET INOP light fails to illuminate.

TEST switch – Hold to OVHT/FIRE

Verify that the fire warning bell sounds.

Verify that the master FIRE WARN lights are illuminated.

Verify that the MASTER CAUTION lights are illuminated.

Verify that the OVHT/DET annunciator is illuminated.

Master FIRE WARN light – Push

Verify that the master FIRE WARN lights are extinguished.

Verify that the fire warning bell cancels.

Verify that the engine No. 1, APU and the engine No. 2 fire switches stay illuminated.

Verify that the ENG 1 OVERHEAT and ENG 2 OVERHEAT lights stay illuminated.

EXTINGUISHER TEST switch – Check

TEST Switch - Position to 1 and hold

Verify that the three green extinguisher test lights are illuminated.

TEST Switch - Release

Verify that the three green extinguisher test lights are extinguished.

Repeat for test position 2.

APU - Start and on bus

When the APU GEN OFF BUS light is illuminated:

APU GENERATOR bus switches - ON

Verify that the SOURCE OFF lights are extinguished.

Verify that the TRANSFER BUS OFF lights are extinguished.

Verify that the STANDBY PWR OFF light is extinguished.

Verify that the APU MAINT light is extinguished.

Verify that the APU LOW OIL PRESSURE light is extinguished.

Verify that the APU FAULT light is extinguished.

Verify that the APU OVERSPEED light is extinguished.

Wheel well fire warning system ..... Test

Test switch – Hold to OVHT/FIRE

Verify fire warning bell sounds, master FIRE WARN lights, MASTER CAUTION lights and OVHT/DET annunciator illuminate.

Fire warning BELL CUTOUT switch – Push

Verify that the master FIRE WARN lights extinguish.

Verify that the fire warning bell cancels.

Verify that the WHEEL WELL fire warning light is illuminated.

Electrical Power Down

This procedure assumes the Secure procedure is complete.

APU switch and/or GRD POWER switch ..... OFF

If APU was operating:

Delay approximately 2 minutes after the APU GEN OFF BUS light extinguishes before placing the BATTERY switch OFF.

BATTERY switch ..... OFF

Standby Power Test

Battery switch ..... ON

AC–DC meter selectors ..... STBY PWR

If APU generator is on–line:

APU GEN No. 1 switch ..... OFF

APU GEN No. 2 switch ..... OFF

If ground power is on–line:

GRD PWR switch ..... OFF

STANDBY POWER switch ..... OFF

Check STANDBY PWR OFF light illuminated.

AC–DC voltmeters ..... Zero

STANDBY POWER switch ..... BAT

Check STANDBY PWR OFF Light extinguished.

AC–DC voltmeters ..... Check

AC voltmeter 115 +/-5 volts

DC voltmeter 24 +/-2 volts

Frequency meter ..... Check

Check frequency meter for normal indication: 400 +/- 10 CPS.

DC meter selector ..... BAT

Check DC voltmeter for normal indication: 24 +/- 2 volts.

Check DC ammeter for discharge indication: a negative value.

DC meter selector ..... AUX BAT

Check DC voltmeter for normal indication: 24 +/- 2 volts.

Check DC ammeter for discharge indication: a negative value.

STANDBY POWER switch ..... AUTO

GRD PWR switch or APU GEN No. 1 and No. 2 switches ..... ON

Note: It may take up to 3 minutes for CDS displays to recover when power is interrupted for more than 2 seconds on the ground.

Battery Start

(With APU bleed or ground air available)

Maintenance documents ..... Check

FLIGHT DECK ACCESS SYSTEM switch ..... Guard closed

BATTERY switch ..... Guard closed

G-EZJU - G-EZJW

Note: Do not move the airplane until Integrated Standby Flight Display (ISFD) alignment is complete.

ELECTRIC HYDRAULIC PUMPS switches ..... OFF

LANDING GEAR lever .....DN

Verify that the green landing gear indicator lights are illuminated.

Verify that the red landing gear indicator lights are extinguished.

FLAP lever ..... Set

Position the flap lever to agree with the flap position.

Emergency equipment ..... Check

Fire extinguisher - Checked and stowed

Crash axe - Stowed

Escape ropes - Stowed

Other needed equipment - Checked and stowed.

Flight recorder switch ..... Guard closed

Circuit breakers ..... Check

Accomplish the Interior and Exterior Inspection if required, except for items requiring electrical or hydraulic power.

Accomplish the following Preflight Procedure - First Officer items:

Overheat and fire protection panel ..... Check

TEST switch - Hold to FAULT/INOP

TEST switch - Hold to OVHT/FIRE

EXTINGUISHER TEST switch - Check

APU switch
(bleed air source, if available) ..... START

On the captain's command, the first officer reads and the captain does the following items:

Oxygen ..... Test and set

G-EZJO - G-EZKG
CAB/UTIL power switch ..... ON

G-EZJO - G-EZKG
IFE/PASS seat power switch ..... ON

G-EZJA - G-EZJN
GALLEY power switch ..... ON

EMERGENCY EXIT LIGHTS switch ..... Guard closed

Passenger signs ..... Set

HYDRAULIC PUMP switches ..... ON

Air conditioning panel ..... Set

APU BLEED air switch - ON

PACK switches - AUTO or HIGH

Engine BLEED air switches - ON

Cabin pressurization panel ..... Set

FLIGHT ALTITUDE indicator - Cruise altitude

LANDING ALTITUDE indicator - Destination field elevation

Pressurization mode selector - AUTO

Parking brake ..... Set

Note: The wheels should be chocked in case the brake pressure has bled down.

Papers ..... Aboard

When cleared for Engine Start, do the following:

Air conditioning PACK switches ..... OFF

ANTICOLLISION light switch ..... ON

Ignition select switch ..... IGN-R

Engine Start

Engine No. 1 start ..... Accomplish

Only N1, N2, and oil quantity are displayed until the EEC's are powered.

Generator 1 switch ..... ON

IRS mode selectors ..... OFF, then NAV

Verify that the ON DC lights illuminate, then extinguish

Verify that the ALIGN lights are illuminated.

FMC/CDU ..... Set IRS position

WARNING: If engine No. 1 was started using a ground air source, to minimize the hazard to ground personnel, the external air should be disconnected and engine No. 2 started using the Engine Crossbleed Start procedure.

Engine No. 2 start ..... Accomplish

Generator 2 switch ..... ON

Complete the Preliminary Preflight Procedure - Captain or First Officer by doing the following items:

PSEU light ..... Verify extinguished

GPS light ..... Verify extinguished

SERVICE INTERPHONE switch ..... OFF

ENGINE panel ..... Set

Verify that the REVERSER lights are extinguished

Verify that the ENGINE CONTROL lights are extinguished

EEC switches - ALTN then ON

Oxygen panel ..... Set

CREW OXYGEN pressure indicator - Check

Verify that the pressure meets dispatch requirements.

Note: PASSENGER OXYGEN switch activation causes deployment of the passenger oxygen masks.

PASSENGER OXYGEN switch - Guard closed

Verify that the PASS OXY ON light is extinguished.

Landing gear indicator lights ..... Verify illuminated

Manual gear extension access door ..... Closed

Accomplish the CDU Preflight Procedure, Preflight Procedure - First Officer and Preflight Procedure - Captain to ensure that the flight deck preparation procedure is complete.

BEFORE TAXI checklist ..... Accomplish

IRS alignment ..... Complete

The airplane is ready for taxi. Refer to the normal checklists for subsequent checks.

Starting with Ground Air Source (AC electrical power available)

Engine No. 1 must be started first.

When cleared to start:

APU BLEED air switch ..... OFF

Engine No. 1 start ..... Accomplish

Use normal start procedures.

WARNING: To minimize the hazard to ground personnel, the external air should be disconnected, and engine No. 2 started using the Engine Crossbleed Start procedure.

Engine Crossbleed Start

Prior to using this procedure, ensure that the area to the rear is clear.

Engine BLEED air switches ..... ON

APU BLEED air switch ..... OFF

PACK switches ..... OFF

ISOLATION VALVE switch ..... AUTO

Ensures bleed air supply for engine start.

Engine thrust lever (operating engine) ..... Advance thrust lever until bleed duct pressure indicates 30 PSI

Non–operating engine ..... Start

Use normal start procedures with crossbleed air.

After starter cutout, adjust thrust on both engines, as required.

Setting N1 Bugs with an Inoperative FMC

Reference the Performance – Inflight section to determine N1 setting for desired phase of flight.

N1 SET outer knob ..... BOTH

The last FMC computed value is displayed by reference N1 bugs and readouts. If the FMC has not calculated an input since power up, a default value of 104% is displayed.

N1 SET inner knob ..... Set N1

Note: If the N1 SET outer knob is returned to the AUTO position, the bugs and readouts will revert to the last FMC computed value or 104% if the FMC has not calculated an input since power up.

Intentionally
Blank

Fire and Overheat System Test with an Inoperative Loop

To determine the specific inoperative loop:

OVHT DET switches ..... A

Test switch ..... OVHT/FIRE

If the FAULT light remains extinguished and both ENG OVERHEAT lights and engine fire warning switches illuminate, loop A is good.

If the FAULT light illuminates and one of the ENG OVERHEAT lights and corresponding engine fire warning switch remain extinguished, there is a fault in loop A of the detection system of that engine.

OVHT DET switches ..... B

Test switch ..... OVHT/FIRE

If the FAULT light remains extinguished and both ENG OVERHEAT lights and engine fire warning switches illuminate, loop B is good.

If the FAULT light illuminates and one of the ENG OVERHEAT lights and corresponding engine fire warning switch remain extinguished, there is a fault in loop B of the detection system of that engine.

OVHT DET switches ..... As required

Select the good loop for each engine (NORMAL if both loops tested good).

Test switch ..... OVHT/FIRE

If the test is successful leave the fire panel in this configuration for flight.

Intentionally
Blank

Flight Controls Check

This is a check of normal flight control functions and is not a complete check of the flight control system. Two people are required; both on interphone.

FLIGHT DECK ACTION	GROUND RESPONSE
Electrical power (APU or external) – On bus	
System A and B electric hydraulic pump switches – OFF	
Control wheel – Left	"LEFT AILERON UP, TAB DOWN; RIGHT AILERON DOWN, TAB UP"
Control wheel – Right	"LEFT AILERON DOWN, TAB UP; RIGHT AILERON UP, TAB DOWN"
Control wheel – Neutral	
Control column – Forward	"ELEVATOR DOWN, TABS UP"
Control column – Aft	"ELEVATOR UP, TABS DOWN"
Control column – Neutral	
Request hydraulic clearance	"CLEAR FOR HYDRAULIC PRESSURE, WING AND CONTROL AREAS CLEAR"
System A and B electric hydraulic pump switches – ON Verify System A & B pressure indicators and brake pressure indicator read 2800 psi minimum	
Parking brake – Set	

FLIGHT DECK ACTION	GROUND RESPONSE
Rudder trim – Turn left Verify left rudder pedals move forward	
Rudder trim – Turn right Verify right rudder pedals move forward	
Rudder trim – Zero, pedals centered	
Aileron trim – Turn left Verify control wheel turns to left	
Aileron trim – Turn right Verify control wheel turns to right	
Aileron trim – Zero, control wheels centered	
Flap lever – UP Verify flap position indicator reads zero	
Nose gear steering wheel – Hold Control wheel – Left Control column – Forward Rudder pedal – Left	"LEFT AILERON UP, TAB DOWN; LEFT FLIGHT SPOILERS UP; RIGHT AILERON DOWN, TAB UP; RUDDER LEFT; ELEVATORS DOWN, TABS UP"
Nose gear steering wheel – Hold Control wheel – Right Control column – Aft Rudder pedal – Right	"LEFT AILERON DOWN, TAB UP; RIGHT FLIGHT SPOILERS UP; RIGHT AILERON UP, TAB DOWN; RUDDER RIGHT; ELEVATORS UP, TABS DOWN"
Flight controls – Neutral	
Alternate flaps master switch – ARM	

FLIGHT DECK ACTION	GROUND RESPONSE
Flap lever – Position 1 Verify no flap movement	
Alternate flaps position switch – hold DOWN until flap position indicator indicates 1	"FLAPS MOVING DOWN"
Flap position indicator – flaps 1 Verify aft overhead leading edge devices annunciator panel indicates all green (FULL EXTEND) with no amber lights illuminated. Verify LE FLAPS TRANSIT light remains illuminated	"ALL LEADING EDGE DEVICES FULLY EXTENDED"
Alternate flaps master switch – OFF Verify Aft overhead leading edge devices annunciator panel indicates all leading edge flaps full extended and all leading edge slats in extend position Verify LE FLAPS EXT light illuminated	"LEADING EDGE FLAPS FULLY EXTENDED, ALL LEADING EDGE SLATS RETRACTED TO EXTEND POSITION"
Speed brake lever – UP	"ALL SPOILERS UP"
Speed brake lever – DOWN	"ALL SPOILERS DOWN"
Stabilizer trim switches – NOSE DOWN	"STABILIZER LEADING EDGE MOVING UP"
Stabilizer trim switches – NOSE UP	"STABILIZER LEADING EDGE MOVING DOWN"
With stabilizer still moving: Stabilizer trim cutout switches – CUTOUT Verify trim motor stops	

FLIGHT DECK ACTION	GROUND RESPONSE
Stabilizer trim cutout switches – NORMAL Verify Trim motor resumes Control column – Forward Verify Trim motor stops Column actuated stab trim override – OVERRIDE Verify Trim motor resumes	
Stabilizer trim switches – Trim into green band	
Column actuated stab trim override – NORMAL Switch guard – Close	
Request clearance to flaps 30	"FLAPS CLEAR"
Flap lever – Position 30	"FLAPS MOVING DOWN"
Control column – Forward	"ELEVATOR DOWN, TABS DOWN"
Control column – Aft	"ELEVATOR UP, TABS UP"
Control column – Neutral	
Flap lever – UP	"FLAPS MOVING UP"
Parking Brake – As desired Electrical power – As desired	

Altimeter Difference

Note: If flight in RVSM airspace is planned use the RVSM table in the limitations section.

This procedure is accomplished when there is a noticeable difference between the altimeters. Accomplish this procedure in stabilized level flight or on the ground.

Altimeter barometric settings ..... Check

Check all altimeters set to proper barometric setting for phase of flight.

Standby altimeter baro set control .....Rotate and reset

Rotate to a different setting, then reset proper barometric setting.

Altimeters ..... Crosscheck

Maximum differences between the altimeter readings:

Altitude	CDS/CDS	CDS/Standby
Sea Level	50 feet	50 feet
5,000 feet	50 feet	80 feet
10,000 feet	60 feet	120 feet
15,000 feet	70 feet	(see note)
20,000 feet	80 feet	(see note)
25,000 feet	100 feet	(see note)
30,000 feet	120 feet	(see note)
35,000 feet	140 feet	(see note)
40,000 feet	160 feet	(see note)
41,000 feet	170 feet	(see note)

Note: Above 10,000 feet and 0.4 Mach, position error causes the tolerance to diverge rapidly and direct crosscheck becomes inconclusive. Between 10,000 feet and 29,000 feet, differences greater than 400 feet should be suspect and verified by ground maintenance checks. Between 29,000 feet and the maximum operating altitude, differences greater then 500 feet should be suspect and verified by ground maintenance checks.

If it is not possible to identify which altimeter is indicating the correct altitude:

ATC ..... Notify

QFE Operation

This procedure is accomplished when ATC altitude assignments are referenced to QFE altimeter settings.

Note: Do not use LNAV or VNAV below transition altitude/level. Altitudes in the navigation data base are not referenced to QFE. Use only raw data for navigation.

Altimeters ..... Set

Set altimeters to QFE when below transition altitude/level.

Note: If QFE altimeter setting is beyond the range of the altimeters, QNH procedures must be used with QNH set in the altimeters.

Landing altitude indicator ..... Set at zero

G-EZJA - G-EZJC

Terrain inhibit switch ..... TERRAIN INHIBIT

Setting Airspeed Bugs with an Inoperative FMC

To set reference airspeed bugs for takeoff:

Speed reference selector (outer) V1

Default speed of 80 knots is displayed.

Speed reference selector (inner) .....Set V1 speed

V1 bug is displayed when a speed greater than 80 knots is set. The NO VSPD flag is displayed until both V1 and VR are set.

Speed reference selector (outer) ..... VR

Default speed of 80 knots is displayed.

Speed reference selector (inner) ..... Set VR speed

VR bug is displayed when a speed greater than 80 knots is set. The NO VSPD flag is removed after both V1 and VR are set.

MCP speed selector .....Set V2

Airspeed cursor and V2+15 bug move to the correct speeds.

Speed reference selector (outer) ..... WT

Default weight of 32,000 kgs is displayed.

Speed reference selector (inner) ..... Set takeoff gross weight

Flaps up maneuver speed bug is displayed.

Note: If VREF is selected on the ground, INVALID ENTRY is displayed.

To set the spare bug, if desired:

Speed Reference selector (outer) .....Spare bug

Default speed of 60 knots is displayed.

Speed reference selector (inner).....Set

Set speed as desired.

Speed reference selector (outer) ..... SET

Digital readout is removed.

Note: When the flap lever is set to any takeoff flap setting above flaps 1, a bug comes into view for the next smaller flap maneuvering speed, between takeoff flaps and flaps up. For example, if the flap lever is set to 15 for takeoff, a bug for flaps 5 maneuvering speed will appear. For a flaps 1 takeoff, the flaps 1 maneuvering speed will be displayed.

To set reference airspeed bugs for approach:

Speed reference selector (outer) ..... WT

Default weight of 32,000 kgs is displayed.

Speed reference selector (inner) ..... Set current gross weight

Flaps up maneuver speed bug is displayed.

Speed reference selector (outer) ..... VREF

Default speed of 80 knots is displayed.

Speed reference selector (inner) ..... Set VREF speed

The green VREF bug and white VREF +15 bug are shown when a speed greater than 80 knots is set.

Note: If V1 or VR is selected in flight, INVALID ENTRY is displayed.

To set the spare bug, if desired:

Speed reference selector (outer) ..... Spare bug

Default speed of 60 knots is displayed.

Speed reference selector (inner) ..... Set

Set speed as desired.

Speed reference selector (outer) ..... SET

Digital readout is removed.

Tests

Transponder Test

Transponder mode selector ..... TEST

Check fail light illuminates.

Check all code segments illuminate. Verify no error codes exist.

Verify aural indicates TCAS system test passed.

Note: TCAS TEST is displayed on the navigation display during the test followed by TCAS TEST PASSED or TCAS TEST FAILED. This test remains in view for 8 seconds then blanks. An aural annunciation sounds at the completion of the test.

G-EZJN, G-EZJT - G-EZKG

AURAL ALERTS	DEFINITION
"TCAS TEST" "TCAS TEST FAIL"	Test failed. Maintenance required.
"TCAS TEST" "TCAS TEST OK"	Test complete. System operable.

G-EZJA - G-EZJM, G-EZJO - G-EZJS

AURAL ALERTS	DEFINITION
"TCAS SYSTEM TEST FAIL"	Test failed. Maintenance required.
"TCAS SYSTEM TEST OK"	Test complete. System operable.

Weather Radar Test

EFIS mode selector ..... MAP, MAP CTR, VOR, or APP

Weather Radar Mode ..... TEST

WXR (EFIS control panel) ..... ON

Verify test pattern consisting of the following colors appears:

- Green
- Yellow
- Red
- Magenta.

If testing of the PWS system is desired:

Weather Radar Mode ..... Deselect TEST

WXR (EFIS control panel) ..... ON

Weather Radar Mode ..... TEST

Verify the amber WINDSHEAR caution, red WINDSHEAR warning and PWS FAIL annunciations display momentarily and then extinguish.

Note: In the short time the weather radar is on and not in the TEST position, it will radiate.

IRS

Align Light(s) Flashing

Do not move IRS Mode selector to OFF except where called for in procedure.

POS INIT page ..... Select

Set IRS position ..... Enter present position

Enter present position using the most accurate latitude and longitude available. If the present position is being entered via the CDU and a position is already displayed on the SET IRS POS line, enter new position over displayed position.

If ALIGN light continues to flash:

Set IRS position ..... Enter present position

Re-enter same present position.

If ALIGN light continues to flash after re-entry:

IRS ..... OFF

Rotate IRS Mode Selector to OFF and verify ALIGN light extinguished.

Note: Light must be extinguished before continuing with procedure (approximately 30 seconds.)

IRS ..... NAV

Rotate IRS Mode Selector to NAV and verify ALIGN light illuminated.

Set IRS position ..... Enter

Enter present position. If ALIGN light flashes, re-enter same present position over displayed position.

Note: Approximately five to seventeen minutes are required for alignment.

If ALIGN light continues to flash, maintenance action is required.

Fast Realignment

Prior to commencing procedure the airplane must be parked and not moved until procedure is complete and ALIGN lights extinguish.

IRS mode selectors ..... ALIGN

Observe ALIGN lights illuminate steadily.

CDU ..... Set

Enter present position on SET IRS POS line of the POS INIT page.

IRS mode selector ..... NAV

Observe ALIGN light extinguished within 30 seconds.

Note: If time permits it is preferable to perform a full alignment of the IRS. A more precise alignment will result.

Note: If the mode selector is accidentally switched to OFF or ATT, position mode selector to OFF, wait for ALIGN light(s) to extinguish, then perform full alignment procedure.

Inadvertent Selection of Attitude Mode (while on the ground)

Inadvertent selection of the attitude mode may be due to physically overpowering the switch during turn–on or may be the result of a faulty switch which prevents the flight crew from accurately determining which mode is selected.

If ATT position is selected inadvertently when switching to NAV

IRS mode selectors .....OFF

Observe ALIGN lights extinguish.

After ALIGN lights extinguish, initiate a full alignment.

IRS Entries

Present Position Entry

IRS mode selector .....NAV

ALIGN lights must be illuminated (steady or flashing).

IRS display selector .....PPOS

Latitude .....Enter

Key–in latitude in the data display, beginning with N or S, then press the ENT Key (the Cue Lights extinguish).

Longitude .....Enter

Key–in longitude in the data display, beginning with E or W, then press the ENT key (the cue lights extinguish). Observe that proper latitude and longitude are displayed and that the ALIGN light is not flashing.

Heading – Enter through CDU

FMC/CDU POS INIT page ..... Select

Enter the correct heading into the CDU scratch pad then press line select key 5R. Verify entered heading appears on line 5R. Select HDG on the IRS display selector and verify that the entered heading is displayed on the navigation displays.

Heading – Enter through ISDU

IRS display selector .....HDG

Press the H key to initiate a heading entry.

Key–in present magnetic heading. Press the ENT key (the cue lights extinguish). Observe proper heading displayed on the navigation displays.

Lateral Navigation (LNAV)

Proceeding Direct to a Waypoint (overwrite)

RTE LEGS page ..... Select

On page 1/XX, line 1L, enter desired waypoint over the presently active waypoint.

Correct any ROUTE DISCONTINUITY if entered waypoint was not in original flight plan.

If abeam waypoints are desired:

ABEAM PTS key ..... Push

EXEC key ..... Push

Observe the MOD RTE LEGS page changes to ACT.

Proceeding Direct to a Waypoint (DIR/INTC)

DIR INTC key ..... Push

Observe DIRECT TO box prompts displayed in line 6L.

Enter desired waypoint on the DIRECT TO line. Observe the waypoint automatically transfers to line 1L.

Correct any ROUTE DISCONTINUITY if entered waypoint was not in the original flight plan.

EXEC key ..... Push

Observe MOD RTE LEGS page changes to ACT.

Intercepting a Leg (Course) to a Waypoint

RTE LEGS page ..... Select

On page 1/XX, line 1L, enter desired waypoint over presently active waypoint.

Observe INTC CRS prompt displayed in line 6R.

Enter the desired intercept course in the INTC CRS line. Observe the desired course is displayed on line 6R but, with magnetic variation differences in line 1.

Correct any ROUTE DISCONTINUITY if the entered waypoint was not in original flight plan.

EXEC key ..... Push

Observe MOD RTE LEGS page changes to ACT.

LNAV may disengage after execution of an intercept leg to a waypoint. If LNAV disengages, turn to a heading to satisfy LNAV capture criteria, as described in Chapter 11, and then engage LNAV.

Intercepting a Leg (Course) to a Waypoint (DIR/INTC)

DIR INTC key ..... Push

Observe INTC LEG TO box prompts displayed in line 6R.

Enter the desired waypoint on the INTC LEG TO line. Observe the waypoint automatically transfers to line 1L.

Enter the desired intercept course in the INTC CRS line. Observe the desired course is displayed on line 6R but, with magnetic variation differences in line 1.

Correct any ROUTE DISCONTINUITY if the entered waypoint was not in original flight plan.

EXEC key ..... Push

Observe MOD RTE LEGS page changes to ACT.

LNAV may disengage after execution of an intercept leg to a waypoint. If LNAV disengages, turn to a heading to satisfy LNAV capture criteria, as described in Chapter 11, and then engage LNAV.

Route Modification

RTE LEGS or RTE page ..... Select

Line select existing waypoints in the desired sequence.

Key–in any new waypoints in the scratch pad and line select into the flight plan. Correct any ROUTE DISCONTINUITIES.

EXEC key ..... Push

Observe MOD RTE or MOD RTE LEGS page changes to ACT.

Route Removal

RTE page ..... Select

ORIGIN .....Enter

If EXEC key illuminates

EXEC key ..... Push

Linking a Route Discontinuity

Correct the ROUTE DISCONTINUITY by entering or deleting waypoints in a sequence that provides a continuous flight–plan path.

EXEC key ..... Push

Observe MOD RTE or MOD RTE LEGS page changes to ACT.

Determining ETA and Distance to Cross Radial (Bearing) or Distance from a Fix

FIX INFO page ..... Select

Enter the identifier of the reference waypoint (normally an off–route waypoint) onto the FIX line. Enter the desired radial or distance from the FIX on a RAD/DIS line, or line select the ABM prompt if the desired radial from the FIX is perpendicular to the present route/course.

Time and distance to go ..... Check

Check ETA and DTG, as desired.

Note: If ETA and DTG are not displayed, the fix radial and/or distance do not intersect the route.

Changing Destination

RTE page ..... Select

Enter the new destination over the original DEST. Enter desired routing to the new destination using the RTE, RTE LEGS, and ARRIVALS pages, as appropriate. Correct any ROUTE DISCONTINUITY.

EXEC key ..... Push

Observe the MOD RTE or MOD RTE LEGS page changes to ACT.

Note: If destination is changed during climb, performance predictions may be blanked if the new flight plan is incompatible with the entered cruise altitude. Correct by entering a lower CRZ ALT on the CLB page.

Entering Holding Fix Into Route

HOLD key ..... Push

(If RTE HOLD page is displayed, observe NEXT HOLD prompt. Line select 6L until (RTE LEGS) HOLD AT page is displayed.)

Observe HOLD AT box prompts and PPOS prompt (if in flight) are displayed. Enter the holding fix in line 6L, or line select PPOS.

If the holding fix is a waypoint in the active route, or PPOS was selected, observe MOD RTE HOLD page displayed. If the holding fix is a waypoint not in the active route, observe message HOLD AT XXXXX displayed in the scratch pad. Enter the holding fix into the route by line selecting in the desired waypoint sequence. Observe the MOD RTE HOLD page displayed. If displayed holding details are incorrect or inadequate, enter correct information on appropriate line(s).

EXEC key ..... Push

Observe MOD RTE HOLD page changes to RTE HOLD (ACT RTE HOLD if holding at PPOS).

Exiting Holding Pattern

HOLD key ..... Push

Observe EXIT HOLD prompt displayed.

EXIT HOLD line select key ..... Push

Observe EXIT HOLD prompt changes to EXIT ARMED.

EXEC key ..... Push

Observe EXIT ARMED is highlighted in reverse video and LNAV flight returns to the holding fix and resumes the active route.

Note: The holding pattern may be exited by performing a DIRECT TO modification if desired. In this case, the flight path may not return to the holding fix before proceeding to the selected waypoint.

Note: A late sequencing of the hold exit waypoint may occur if multiple route modifications are performed just prior to exiting the hold. LNAV guidance may be temporarily interrupted while sequencing the hold exit waypoint.

Along Track Displacement

RTE LEGS page ..... Select

Line select the reference waypoint to the scratch pad. Add a "/" and the + or – distance desired. (EX: SEA/15 for a point 15 miles downtrack from SEA)

Line select the reference waypoint. (The FMC will automatically position the created waypoint to appropriate position.)

EXEC key ..... Push

Observe the MOD RTE LEGS page change to ACT.

Entering Created Waypoints on the Route or Route Legs Pages

Note: Created waypoints are stored in the temporary navigation data base for one flight only.

RTE or RTE LEGS page ..... Select

Using any of the following methods, key into the scratch pad the parameters which define the new created waypoint (place identifiers must already be stored in one of the FMC data bases):
- Place bearing/distance (for example, SEA250/40);
- Place bearing/place bearing (for example, SEA180/ELN270);
- Along–track displacement (for example, SEA/-10);
- Latitude and longitude (for example, N4731.8W12218.3).

Enter into the route by line selecting to the appropriate waypoint sequence.

Repeat the above steps to define additional created waypoints as desired. Correct any ROUTE DISCONTINUITY.

EXEC key ..... Push

Observe the MOD RTE or MOD RTE LEGS page changes to ACT (for an inactive route, activate and execute on the RTE or RTE LEGS page).

Entering Created Waypoints on the Nav Data Pages

Note: Created waypoints entered on the SUPP NAV DATA pages (permitted on the ground only) are stored in the supplemental navigation data base for an indefinite time period; those entered on REF NAV DATA pages are stored in the temporary navigation data base for one flight only.

INIT/REF key ..... Push

Observe INDEX prompt displayed.

INIT/REF INDEX page ..... Select

Observe the NAV DATA prompt displayed. To access the SUPP NAV DATA page, enter SUPP into the scratch pad.

NAV DATA page ..... Select

(If the SUPP NAV DATA page is selected, observe the EFF FRM date line displayed. If an effective date had not been previously entered, box prompts are displayed. The effective date must be entered before proceeding. If required, enter the current or appropriate date on EFF FRM line and execute.)

Data .....Enter

Enter a crew-assigned identifier on either the WPT IDENT, NAVAID IDENT, or AIRPORT IDENT line, as appropriate. Use the navaid category only for stations with DME.

For a WPT IDENT entry, define the waypoint with entries for either latitude and longitude, or with entries for REF IDENT and RADIAL/DIST (REF IDENT identifier must already be stored in one of the FMC data bases).

For a NAVAID IDENT or AIRPORT IDENT entry, enter appropriate data.

EXEC key illuminates when data has been entered into all box prompts.

EXEC key ..... Push

Repeat above steps to define additional created waypoints as desired. To enter a new identifier in the same category, simply overwrite the previous identifier.

Note: To enter a created waypoint into the flight plan, key the identifier into the scratch pad and follow the route modification procedure.

Deleting Created Waypoints on the Nav Data Pages

INIT/REF key ..... Push

Observe the INDEX prompt displayed.

INIT/REF INDEX page ..... Select

Observe the NAV DATA prompt displayed. To access the SUPP NAV DATA page, key SUPP into the scratch pad.

NAV DATA page ..... Select

Enter the identifier on either the WPT IDENT, NAVAID IDENT, or AIRPORT IDENT line, as appropriate.

Data ..... Delete

Push the DEL key and then line select the identifier. Observe the EXEC key illuminates.

EXEC key ..... Push

Data previously entered is deleted. Observe NAV DATA page displayed with prompts.

Entering a Crossing Radial (Bearing) or Distance from a Fix as a Route Waypoint

FIX INFO page ..... Select

Enter identifier of the reference waypoint (normally an off–route waypoint) onto the FIX line. Enter the desired radial or distance from the FIX on a RAD/DIS line, or line select the ABM prompt if the desired radial or distance from the FIX is perpendicular to the present route/course.

Line select the desired intersection (lines 2L–5L) into the scratch pad and observe the new created waypoint displayed as FIX/Radial/Distance.

RTE LEGS page ..... Select

Line select the new created waypoint, displayed in the scratch pad, to the desired waypoint sequence.

Repeat the above steps to define additional created waypoints as desired. Correct any ROUTE DISCONTINUITIES.

EXEC key ..... Push

Observe the MOD RTE LEGS page changes to ACT.

Note: These created waypoints are stored in the temporary navigation data base for one flight only.

Entering a Lateral Offset

RTE page ..... Select

Observe the OFFSET prompt displayed.

LATERAL OFFSET page ..... Select

Observe dash prompts for OFFSET DIST.

OFFSET DIST .....Enter

Enter desired offset distance using format Lxx or Rxx for left or right offset up to 99 nm. Observe dash prompts for START WAYPOINT and END WAYPOINT.

START/END WAYPOINT .....Enter

If no start/end waypoint is entered, offset will begin/end at first/last valid offset leg.

Change SID or Runway

This entire procedure must be accomplished when a SID is used and the runway or SID is changed. This will prevent the possibility of incorrect routing or inadequate obstacle clearance.

DEPARTURES page ..... Select

RUNWAY .....Reselect

SID .....Reselect

TRANSITION (if required) .....Reselect

RTE LEGS page ..... Select

WAYPOINT SEQUENCE and ALTITUDES .....Check

Modify as necessary to agree with clearance.

EXEC key ..... Push

Change STAR, PROF DES, or APP

The associated airport must be entered as route origin or destination.

ARRIVAL page ..... Select

STAR or PROFILE DESCENT (if required) ..... Select

TRANSITION (if required) ..... Select

APPROACH ..... Select

APPROACH TRANSITION (if required) ..... Select

RTE LEGS page ..... Select

WAYPOINT SEQUENCE ..... CHECK

Modify as necessary to agree with clearance.

EXEC key ..... Push

Delete Procedure Turn

DEP/ARR page ..... Select

Approach ..... Select

Reselecting same approach or selecting a new approach will remove procedure turn and select a straight in approach on the LEGS page.

EXEC key ..... Push

or

RTE LEGS page ..... Select

Select last waypoint of procedure turn to scratchpad and overwrite PROC TURN line. Check waypoint sequencing to comply with clearance.

EXEC key ..... Push

Other Operations

FMC Navigation Check

If the IRS NAV ONLY, VERIFY POSITION, or UNABLE REQUIRED NAV PERFORMANCE – RNP message is displayed in the scratch pad, or course deviation is suspected, accomplish the following as necessary to ensure navigation accuracy:

Actual position ..... Determine and compare with FMC position

Determine actual airplane position using raw data from VHF navigation or ADF radios.

If radio navaids are unavailable:

FMC position ..... Compare with the IRS position

Use the POS SHIFT page of the FMC CDU. If the two IRS positions are in agreement and the FMC position is significantly different, the FMC position is probably unreliable. The POS SHIFT page may be used to shift FMC position to one of the IRS positions. This is accomplished by line selecting the IRS or radio position and then pressing the EXEC Key.

Actual position ..... Confirm with ATC radar or visual reference points.

Navigate using most accurate information available (continue to monitor FMC position using VOR/ADF raw data displays on non–flying pilot's navigation display).

CAUTION: Navigating in LNAV mode with an unreliable FMC position may result in significant navigation errors.

Navigate by conventional VOR/ADF procedures, radar vectors from ATC, dead reckoning from last known position, and/or use of visual references.

Inhibiting VOR/DME Use for Position Updating

Note: This procedure inhibits the use of VOR/DME information for FMC position updating. Use DEL key to remove a VOR/DME from inhibit status.

PROG page ..... Select

Observe NAV STATUS prompt displayed.

NAV STATUS page ..... Select

NAV OPTIONS page ..... Select (NEXT/PREV page)

Observe dash prompts for VOR/DME INHIBIT. Enter desired VOR/DME identifier (a previous entry may be overwritten but will no longer be inhibited).

Inhibiting GPS Updating

Note: GPS position updates are allowed for all United States National Airspace approach operations. Outside this region, GPS position updates are allowed during approaches only if the FMC database and approach charts are referenced to the WGS-84 reference datum. GPS updates should be inhibited for all other approach operations, unless other appropriate procedures are used.

PROG page ..... Select

Observe NAV STATUS prompt displayed.

NAV STATUS page ..... Select

NAV OPTIONS page ..... Select (NEXT/PREV page)

GPS UPDATE ..... OFF

Vertical Navigation (VNAV)

Temporary Level Off during Climb or Descent (Not at FMC Cruise Altitude)

MCP altitude selector ..... Set desired altitude

MCP N1 light will extinguish if leveling from a climb.

N1 Limit changes to CRZ if leveling from a climb.

To continue climb/descent:

MCP altitude selector ..... Set desired altitude

Entering Waypoint Speed and Altitude Restriction (On Climb or Descent Legs Only)

RTE LEGS page ..... Select

Key–in desired speed and altitude, or speed only (followed by /), or altitude only, into scratch pad.

An altitude followed by A or B signifies a requirement to be “at or above” or “at or below” that altitude at the waypoint (for example, key–in 220A or 240B).

Line select to desired waypoint line.

EXEC key ..... Push

Observe MOD RTE LEGS page changes to ACT.

Note: This changes any prior speed and altitude restriction at this waypoint.

Deleting Waypoint Speed and Altitude Restriction

RTE LEGS page ..... Select

Push DEL key to enter DELETE in scratch pad. Line select to appropriate waypoint line.

EXEC key ..... Push

Observe MOD RTE LEGS page changes to ACT and restriction is deleted and replaced with an FMC predicted value (small size characters).

Changing Speed and/or Altitude Restriction during Climb or Descent

CLB/DES page ..... Select

Push DEL key to enter DELETE in the scratch pad, or key–in the desired speed and altitude in the scratch pad. Line select to the SPD REST line.

EXEC key ..... Push

Observe the MOD CLB or the MOD DES page changes to ACT and the restriction is changed or deleted.

Changing Climb/Cruise/Descent Speed Schedule

CLB/CRZ/DES page ..... Select

Select the prompt for the desired climb/cruise/descent schedule, or key–in the desired speed in the scratch pad and line select to the TGT SPD line.

EXEC key ..... Push

Observe the MOD CLB, MOD CRZ, or MOD DES page changes to ACT and new speed schedule is specified.

Early Descent

MCP altitude selector ..... Set

Set next level–off altitude.

DES page ..... Select

Line select DES NOW prompt.

EXEC key ..... Push

Observe MOD DES page changes to ACT. Observe descent is initiated (if VNAV engaged).

Note: For a PATH DES, this will result in a 1000 FPM rate of descent until the planned path is intercepted. For a SPD DES, this will result in an idle thrust normal rate of descent.

Step Climb or Descent from Cruise

MCP altitude selector ..... Set

Set new level–off altitude.

CRZ page ..... Select

Enter new altitude on the CRZ ALT line. The display changes to MOD CRZ CLB or MOD CRZ DES.

If the desired climb/descent speed is different from the displayed cruise speed, manually enter the desired TGT SPD, or use access prompts to select desired CLB/DES page.

EXEC key ..... Push

Observe the MOD CRZ CLB/MOD CRZ DES page (or other selected MOD CLB/MOD DES page) changes to ACT. Observe climb/descent is initiated at the TGT SPD (if VNAV engaged).

Performance and Progress Functions

Determining ETA and Fuel Remaining for New Destination

RTE page ..... Select

Enter the new destination over the original DEST. Enter correct routing to the new destination using RTE, RTE LEGS, and ARRIVALS pages, as appropriate. Correct any ROUTE DISCONTINUITY.

PROGRESS page ..... Select

Observe new destination with a MOD title. Check ETA and FUEL remaining.

RTE page ..... Select

EXEC or ERASE the new destination/routing, as desired. Observe MOD RTE page changes to ACT.

Estimated Wind Entries for Cruise Waypoints

RTE LEGS page ..... Select

Observe the DATA prompt displayed.

RTE DATA page ..... Select

Enter the estimated true wind direction/speed on the appropriate line(s).

Step Climb Evaluation

CRZ page ..... Select

Enter the desired step climb altitude on the STEP line. If known, enter the estimated average true wind direction/speed for the desired step climb altitude on the ACTUAL WIND line.

Step climb savings ..... Determine

Observe the fuel SAVINGS/PENALTY and FUEL AT _____ (destination) lines to determine if a higher cruise altitude is advantageous.

If step climb fuel savings are significant, use the appropriate climb procedure to initiate climb to the higher altitude when NOW is displayed on STEP POINT line.

Note: Step climb evaluations do not consider buffet margin limits. If the altitude entered for the step climb evaluation is higher than the maximum altitude for flight with an adequate buffet margin, the message "MAX ALT FLXXX" will be displayed in the scratch pad. Ensure the new cruise altitude entered for the climb is at or below the MAX ALT displayed in the message in order to maintain a safe buffet margin.

Entering Descent Forecasts

DES page ..... Select

Observe FORECAST prompt displayed.

DES FORECASTS page ..... Select

Verify the TRANS LVL and revise if required. Enter average ISA DEV forecast for descent and destination QNH. Enter forecast descent WINDs (for up to three different altitudes).

EXEC key ..... Push

Observe MOD DES FORECASTS page changes to ACT.

Engine Out

Engine out climb and cruise pages provide advisory information for engine out operation. Refer to section 11.41 and 11.42 for a complete description of ENG OUT CLB and ENG OUT CRZ pages.

Required Time of Arrival (RTA)

Note: An active FMC flight plan complete with all performance data must exist before the required time of arrival (RTA) mode can be used.

Entering an RTA Waypoint and Time

RTA PROGRESS page ..... Select

On PROGRESS page 2, line 1L, enter the flight plan waypoint where required time of arrival is applicable. Observe the MOD RTA PROGRESS page displayed with the computed ETA, for the entered waypoint, displayed in line 1R.

RTA ..... Enter

Enter required time of arrival into line 1R. Time should be entered in hours, minutes, and seconds (Examples: 174530, 1745, 1745.5). Observe MOD RTA PROGRESS page displayed with pertinent data for complying with entered RTA. Observe EXEC key illuminated.

EXEC key ..... Push

Observe ACT RTA PROGRESS page displayed.

Entering Speed Restrictions for RTA Navigation

PERF LIMITS page ..... Select

Enter minimum or maximum speed restriction for RTA navigation in lines 2, 3, or 4 depending on phase of flight. Observe RTA parameters change to reflect new limits (RTA PROGRESS page) and EXEC key illuminated.

EXEC key ..... Push

Observe MOD PERF LIMITS page change to ACT PERF LIMITS page.

Note: Entered restrictions on line 2, 3, and 4 also restrict other navigation modes such as ECON.

Entering New Time Error Tolerances for RTA Navigation

PERF LIMITS page ..... Select

Enter desired time error tolerance (5 to 30 seconds) for the RTA waypoint on line 1L (Example: 25). Observe MOD PERF LIMITS page displayed and EXEC key illuminated.

EXEC key ..... Push

Observe ACT PERF LIMITS page displayed.

Additional CDU Functions

Navigation Display Plan Mode (Center Step Operation)

EFIS Control Panel Mode Selector .....PLAN

RTE LEGS page ..... Select

EFIS Control Panel Range Selector ..... As required

MAP CTR STEP key ..... Push

Each push moves the CTR label to the next geographically fixed waypoint in the route. Selecting PREV PAGE or NEXT PAGE moves the CTR label to the first geographically fixed waypoint on the new page.

EFIS Control Panel Mode Selector ..... As required

Enter Position Shift on Runway

TAKEOFF REF page ..... Select

TO SHIFT distance ..... Enter

Enter distance desired from runway threshold. When TO/GA is pushed, FMC will update position to runway threshold plus entered distance.

If position shift must be removed

RTE page ..... Select

RWY ..... Enter

Reenter runway on RTE page. Check and reenter other performance data as required.

Intentionally
Blank

Fuel Balancing

If a fuel leak is suspected:

Accomplish the ENGINE FUEL LEAK checklist.

Maintain main tank No. 1 and No. 2 fuel balance within limitations.

Note: Fuel pump pressure should be supplied to the engines at all times. At high altitude, without fuel pump pressure, thrust deterioration or engine flameout may occur.

If the center tank contains fuel:

Center tank fuel pump switches ..... OFF

[Fuel CONFIG indication may be displayed with fuel in the center tank.]

Crossfeed selector ..... Open

Fuel pump switches (low tank) ..... OFF

When quantities are balanced:

Fuel pump switches (main tank) ..... ON

Center tank fuel pump switches ..... ON

Crossfeed selector ..... Close

If the center tank contains no fuel:

Crossfeed selector ..... Open

Fuel pump switches (low tank) ..... OFF

When quantities are balanced:

Fuel pump switches ..... ON

Crossfeed selector ..... Close

Refueling

Fuel Load Distribution

Main tanks No. 1 and No. 2 should normally be serviced equally until full. Additional fuel is loaded into the center tank until the desired fuel load is reached.

Note: Main tanks No. 1 and No. 2 must be scheduled to be full if the center tank contains more than 453 kgs of fuel. With less than 453 kgs of center tank fuel, partial main tank fuel may be loaded provided the effects of balance have been considered.

Fuel Pressure

Apply from a truck or fuel pit. A nozzle pressure of 50 psi provides approximately 1136 liters per minute.

Normal Refueling

When a full fuel load is required, the fuel shutoff system closes the fueling valves automatically when the tanks are full. When a partial fuel load is required, the fuel quantity indicators are monitored and the fueling valves are closed by manually positioning the fueling valve switches to CLOSED when the desired fuel quantity is aboard the airplane.

Refueling with Battery Only

When the APU is inoperative and external power is not available, refueling can be accomplished as follows:

Battery switch ..... ON

Note: The refueling system will operate normally. Operation is limited only by battery life.

Refueling with No AC or DC Power Source Available

When it becomes necessary to refuel with the APU inoperative, the aircraft battery depleted, and no external power source available, refueling can still be accomplished:

Fueling hose nozzle ..... Attached to the refueling receptacle

Fueling valves ..... Open for the tanks to be refueled

Note: Main tanks No. 1 and No. 2, and the center tank refueling valves each have a red override button that must be pressed and held while fuel is being pumped into the tank. Releasing the override button allows the spring in the valve to close the valve.

Caution must be observed not to overfill a tank, since there is no automatic fuel shutoff during manual operation. When the desired amount of fuel has been pumped into the tanks, the refueling valves for the respective tanks can be released.

Ground Transfer of Fuel

Fuel can be transferred from one tank to another tank by using the appropriate fuel pumps, the fueling valve, the defueling valve, and the crossfeed valve. AC power must be available. To transfer fuel from the main tanks to the center tank:

Main tank fuel pump switches ..... ON

Crossfeed selector ..... Open

Manual defueling valve ..... Open

Center tank fueling valve switch ..... OPEN

Fuel transfer ..... Monitor

The center tank fuel quantity indicator shows an increase in fuel. The main tank indicators show a decrease in fuel.

Center tank fueling valve switch ..... CLOSED

When the required amount of fuel has been transferred, the switch is closed at the fueling panel.

Manual defueling valve ..... Close

Crossfeed selector ..... Close

Main tank fuel pump switches ..... OFF

Main Tanks ..... Refill

Refueling panel and defuel panel access doors ..... Close

Fuel Crossfeed Valve Check

Crossfeed selector .....Open

Verify crossfeed VALVE OPEN light illuminates bright and then dim.

Crossfeed selector ..... Close

Verify crossfeed VALVE OPEN light illuminates bright and then extinguishes.

Introduction

Airplane operation in adverse weather conditions may require additional considerations due to the effects of extreme temperatures, precipitation, turbulence, and windshear. Procedures in this section supplement normal procedures and should be observed when applicable.

The following recommendations apply to adverse weather operations in general:

- Do not use assumed temperature reduced thrust for takeoff on a contaminated runway.
- V1 may be reduced down to minimum V1 (assuming all weight limitations are considered) to provide increased stopping distance performance.
- Takeoffs on slippery runways are not recommended when slush or wet snow is more than 1/2 inch (13mm) in depth.
- Improved stall margins can be achieved by the following:
  - If excess runway is available, consider using improved climb procedures for flaps 5.
  - If runway is limited for the planned takeoff flap setting, consider using the next greater flap position with improved climb performance. This will provide additional stall margins with minimum performance penalties.

Cold Weather Operation

Considerations associated with cold weather operation are primarily concerned with low temperatures and with ice and snow on the airplane, ramps, taxiways and runways.

Icing conditions exist when OAT (on the ground) or TAT (in-flight) is 10°C (50°F) or below and:

- visible moisture (clouds, fog with visibility less than one mile, rain, snow, sleet, ice crystals, and so on) is present, or
- standing water, ice, or snow is present on the ramps, taxiways, or runways.

Note: Do not operate engine or wing anti–ice when in-flight total air temperature (TAT) is above 10°C (50°F.)

Exterior Inspection - Captain or First Officer

Although removal of surface snow, ice or frost is normally a maintenance function, the flight crew should use additional care and scrutiny during preflight preparation to inspect areas where surface snow or frost could change or affect normal system operations.

Do the normal Exterior Inspection with the following additional steps:

Surfaces ..... Check

Check for frost, snow or ice.

Thin hoarfrost is acceptable on the upper surface of the fuselage provided all vents and ports are clear. Thin hoarfrost is a uniform white deposit of fine crystalline texture, which usually occurs on exposed surfaces on a cold and cloudless night, and which is thin enough to distinguish surface features underneath, such as paint lines, markings or lettering.

Control balance cavities ..... Check

Check drainage after snow removal. Puddled water may refreeze in flight.

Landing gear doors ..... Check

Landing gear doors should be free of snow or ice.

Air conditioning inlets and exits ..... Clear

Verify that the air inlets and exits, including the outflow valve, are clear of snow or ice.

If the APU is operating, verify that the outflow valve is fully open.

Engine inlets ..... Clear

Verify that the inlet cowling is free of ice or snow.

Verify that the fan is free to rotate.

APU air inlets ..... Check

The APU inlet door and cooling air inlet must be free of snow or ice prior to APU start.

Fuel tank vents ..... Clear

Check all fuel tank vents. All traces of ice or frost should be removed.

Pitot probes and static ports ..... Clear

Verify that all pitot probes and static ports free of ice and snow. Water rundown after snow removal may refreeze immediately forward of static ports and cause an ice buildup which disturbs airflow over the static ports resulting in erroneous static readings even when static ports themselves are clear.

Preflight Procedure - First Officer

Do the following step after completing the normal Preflight Procedure - First Officer:

PROBE HEAT ..... ON

All probe heat lights – extinguished.

Engine Start Procedure

Do a normal engine start with the following modifications:

- If the engine has been cold soaked for one or more hours at ambient temperatures less than -40°C, do not start or motor the engine. Maintenance personnel should accomplish appropriate procedures for adverse weather heating of the Hydro-Mechanical Unit.
- If the engine has been cold soaked for three or more hours at ambient temperatures less than -40°C, do not start or motor the engine. Maintenance personnel should accomplish appropriate procedures for adverse weather starter servicing.
- If ambient temperature is below -35°C (-31°F), idle the engine for two minutes before changing thrust lever position.
- Up to three and one–half minutes may be allowed for oil pressure to reach the minimum operating pressure. During this period, the LOW OIL PRESSURE light may remain illuminated, pressure may go above the normal range and the FILTER BYPASS light may illuminate. Operate the engine at idle thrust until oil pressure returns to the normal range.

Before Taxi Procedure

Do the normal Before Taxi Procedure with the following modifications:

GENERATOR 1 and 2 switches ..... ON F/O

Normally the engine IDG's will stabilize within one minute, although due to cold oil, up to five minutes may be needed to produce steady power.

Flight controls .....Check C

An increase in control forces can be expected at low temperatures because of increased resistance in cables and thickened oil in snubbers and bearings.

If any flight control is suspected of binding or restricted movement, maintenance personnel should do the appropriate portion of SP.9, Flight Controls Check Supplementary Procedure.

CAUTION: The flap position indicator and leading edge devices annunciator panel should be closely observed for positive movement. If the flaps should stop, the flap lever should be placed immediately in the same position as indicated.

ENGINE ANTI–ICE switches ..... As needed F/O

Engine anti-ice must be ON during all ground operations when icing conditions exist or are anticipated.

WARNING: Do not rely on airframe visual icing cues before activating engine anti-ice. Use the temperature and visible moisture criteria.

When engine anti-ice is needed:

ENGINE START switches ..... CONT F/O

ENGINE ANTI-ICE switches ..... ON F/O

Verify that the COWL VALVE OPEN lights illuminate bright, then dim.

Verify that the COWL ANTI-ICE lights are extinguished.

Note: If the COWL VALVE OPEN lights remain illuminated bright with engines at IDLE, position APU BLEED air switch to OFF and increase thrust slightly (up to a maximum of 30% N1.)

WING ANTI–ICE switch .....As needed F/O

Use wing anti-ice during all ground operations between engine start and takeoff when icing conditions exist or are anticipated, unless the airplane is protected by the application of Type II or Type IV fluid in compliance with an approved ground de–icing program.

WARNING: Do not use wing anti-ice as an alternative for ground de-icing/anti-icing. Close inspection is still needed to ensure that no frost, snow, or ice is adhering to the wing, leading edge devices, stabilizer, control surfaces, or other critical airplane components at takeoff.

When wing anti-ice is needed:

WING ANTI-ICE switch .....ON F/O

Verify that the R and L VALVE OPEN lights illuminate bright, then dim.

Note: The wing anti–ice VALVE OPEN lights may cycle bright/dim due to the control valves cycling closed/open in response to thrust setting and duct temperature logic.

Flaps ..... Check F/O

Move flaps from Flaps up to Flaps 40 back to Flaps up (i.e., full travel) to ensure freedom of movement.

CAUTION: The flap position indicator and leading edge devices annunciator panel should be closely observed for positive movement. If the flaps should stop, the flap lever should be placed immediately in the same position as indicated.

Call “FLAPS ___” as needed. C

Flaps .....As needed F/O

If taxi route is through slush or standing water in low temperatures or if precipitation is falling with temperatures below freezing, taxi with flaps up. Taxiing with flaps extended subjects the flaps and flap drives to snow and slush accumulations from the main gear wheels. Leading edge devices are also susceptible to slush accumulations.

Taxi–Out

Do the following steps during the taxi-out:

Nose wheel steering .....Check C

Nose wheel steering should be exercised in both directions during taxi to circulate warm hydraulic fluid through steering cylinders and minimize steering lag caused by low temperatures.

Engine run up ..... Do as needed C

Run-up to as high a thrust setting as practical (70% N1 recommended) at 30 minute intervals for approximately 30 seconds duration.

If airport surface conditions and the concentration of aircraft do not permit the engine thrust level to be increased to 70%, then set a thrust level and time at that thrust level as high as practical.

Note: When operating in conditions of freezing rain, freezing drizzle, freezing fog or heavy snow, additional momentary run-ups to 70% N1 at intervals of 10 minutes or less should be considered.

Exterior De-icing

Flaps .....UP F/O

Flaps should be positioned up to prevent ice and slush from accumulating in flap cavities during de-icing.

Thrust levers .....Idle C

Stabilizer trim ..... Full APL NOSE DOWN C

Trim the airplane to the electrical APL NOSE DOWN limit. Then continue trimming manually to the manual APL NOSE DOWN limit. The full nose down position prevents de-icing fluid and slush run-off from entering the stabilizer balance panel cavity.

WARNING: To avoid personal injury, ensure that the stabilizer trim wheel handle is stowed prior to using electric trim.

APU and engine BLEED air switches .....OFF F/O

The bleed air switches must be turned off to reduce the possibility of fumes entering the air conditioning system.

CAUTION: With the APU operating, ingestion of de-icing fluid causes objectionable fumes and odors to enter the airplane. This may also cause erratic operation or damage to the APU.

APU ..... As needed F/O

Wait approximately one minute after completion of de-icing to turn engine BLEED air switches on to ensure all de-icing fluid has been cleared from the engine:

Engine BLEED air switches .....ON F/O

Stabilizer trim .....___ UNITS C

Verify stabilizer trim is set for takeoff.

Before Takeoff Procedure

Do the following steps after completing the normal Before Takeoff Procedure:

Call "FLAPS ___ " as needed for takeoff. C

Flap lever .....Set takeoff flaps, as needed F/O

Extend the flaps to the takeoff setting at this time if they have been held because of slush, or standing water, or icing conditions, or because of exterior de-icing.

Verify that the LE FLAPS EXT green light is illuminated.

Stabilizer trim .....___ UNITS C

Verify that the stabilizer trim is set for takeoff.

If airplane de-icing was accomplished:

A visual inspection of the airplane wings should be made by the pilots just prior to takeoff.

Takeoff Procedure

Do the normal Takeoff Procedure with the following modification:

Engine run-up .....Accomplish as needed PF

If moderate to severe icing conditions are present, the takeoff roll must be preceded by a static run-up to 70% N1 and stable engine operation observed prior to brake release. If the airplane starts to slide on ice or snow during engine power check, release brakes and begin takeoff roll. Continue engine check during early part of the takeoff roll.

Climb and Cruise Procedure

Do the normal Climb and Cruise Procedure with the following additional steps:

ENGINE ANTI-ICE switches ..... As needed PM

Engine anti–ice must be ON during all flight operations when icing conditions exist or are anticipated, except during climb and cruise when the temperature is below –40°C SAT. Engine anti–ice must be ON prior to, and during descent in all icing conditions, including temperatures below –40°C SAT.

When operating in areas of possible icing, activate engine anti–ice prior to entering icing conditions. Late selection of engine anti–ice may allow inlet ice buildup and ice shedding into the engine.

WARNING: Do not rely on airframe visual icing cues before activating engine anti–ice. Use the temperature and visible moisture criteria.

When engine anti-ice is needed:

ENGINE START switches ..... CONT PM

ENG ANTI–ICE switches ..... ON PM

Verify that the COWL VALVE OPEN lights illuminate bright, then dim.

Verify that the COWL ANTI–ICE lights are extinguished.

Note: If the COWL VALVE OPEN lights remain illuminated bright with engines at IDLE, position the APU BLEED air switch to OFF and increase thrust slightly (up to a maximum of 30% N1).

CAUTION: Avoid prolonged operation in moderate to severe icing conditions.

Severe icing can usually be avoided by a change in altitude and/or airspeed. If flight in moderate to severe icing conditions cannot be avoided, do the following on both engines, one engine at a time at approximately 15 minute intervals:

Note: At higher altitudes, a descent can be needed:

Thrust .....Increase PF

Increase thrust to a minimum of 80% N1 to ensure the fan blades and spinner are clear of ice.

Engine vibration may occur due to fan blade/spinner icing. If engine vibration continues after increasing thrust, do the following on both engines, one engine at a time:

ENGINE START switch .....FLT PM

Thrust .....Adjust PF

Adjust thrust to 45% N1. After approximately five seconds, increase thrust lever slowly to a minimum of 80% N1.

Note: Engine vibration may reduce to a low level before 80% N1 is reached, however, thrust increase must continue to a minimum of 80% N1 to remove ice from the fan blades.

Note: Engine vibration may indicate full scale prior to shedding ice, however, this has no adverse effect on the engine.

If vibration does not decrease, do the procedure for HIGH ENGINE VIBRATION "If not in icing conditions."

When engine anti–ice is no longer needed:

ENGINE ANTI–ICE switches ..... OFF PM

Verify that the COWL VALVE OPEN lights are extinguished

ENGINE START switches ..... OFF PM

WING ANTI–ICE switch ..... As needed PM

The wing anti–ice system may be used as a de–icer or anti–icer in flight. The primary method is to use it as a de–icer by allowing ice to accumulate before turning wing anti–ice on. This procedure provides the cleanest airfoil surface, the least possible runback ice formation, and the least thrust and fuel penalty.

The secondary method is to use wing anti—ice prior to ice accumulation. Operate the wing anti–ice system as an anti–icer only during extended operations in moderate or severe icing conditions, such as holding.

Ice accumulation on the flight deck window frames, windshield center post or on the windshield wiper arm may be used as an indication of structural icing conditions and the need to turn on wing anti–ice.

Normally it is not necessary to shed ice periodically unless extended flight through icing conditions is necessary (holding).

CAUTION: Use of wing anti-ice above approximately FL350 may cause bleed trip off and possible loss of cabin pressure.

When wing anti–ice is needed:

WING ANTI-ICE switch ..... ON PM

Verify that the R and L VALVE OPEN lights illuminate bright, then dim.

When wing anti–ice is no longer needed:

WING ANTI–ICE switch .....OFF PM

Note: Prolonged operation in icing conditions with the leading edge and trailing edge flaps extended is not recommended. Holding in icing conditions with flaps extended is prohibited.

Approach and Landing

Use normal procedures and reference speeds unless a flaps 15 landing is planned.

If a flaps 15 landing will be made:

Set VREF 15

If any of the following conditions apply, set VREF ICE = VREF 15 + 10:

- engine anti–ice will be used during landing
- wing anti–ice has been used any time during the flight
- icing conditions were encountered during the flight and the landing temperature is below 10° C.

Taxi–In

Do the following steps:

If prolonged operation in icing conditions with the leading and trailing edge flaps extended was needed:

Flaps ..... 15 F/O

Retraction to less than flaps 15 is not recommended until ice has been removed or a ground inspection has been made.

Engine anti–ice .....As needed F/O

If icing conditions exist, engine anti–ice must be ON.

If taxi-in is delayed and icing conditions exist, do the following:

Engine run-up .....As needed C

Run-up to as high a thrust setting as practical (70% N1 recommended) at 30 minute intervals for approximately 30 seconds duration.

If airport surface conditions and the concentration of aircraft do not permit the engine thrust level to be increased to 70%, then set a thrust level and time at that thrust level as high as practical.

Note: When operating in conditions of freezing rain, freezing drizzle, freezing fog or heavy snow, additional momentary run-ups to 70% N1 at intervals of 10 minutes or less should be considered.

Shutdown Procedure

Do the following step before starting the normal Shutdown Procedure:

After landing in icing conditions:

Stabilizer trim ..... Set 0 to 2 units C

Prevents melting snow and ice from running into balance bay areas and prevents the stabilizer limit switch from freezing. With flaps retracted, this requires approximately eight hand wheel turns of manual trim.

WARNING: To avoid personal injury, ensure that the stabilizer trim wheel handle is stowed prior to using electric trim.

Secure Procedure (Airplane Attended)

Do the following steps after completing the normal Secure Procedure:

If warm air circulation through cargo and E/E compartments is desired:

APU ..... Start F/O

APU GENERATOR bus switches ..... ON F/O

Verify that the BUS OFF lights are extinguished.

PACK switches ..... AUTO F/O

ISOLATION VALVE switch ..... OPEN F/O

Pressurization mode selector ..... MAN F/O

Outflow valve switch ..... OPEN F/O

Prevents aircraft pressurization.

Note: The airplane must be parked into the wind when the outflow valve is full open.

APU BLEED air switch ..... ON F/O

Secure Procedure (Airplane Unattended)

Do the following steps after completing the normal Secure Procedure:

If staying overnight at off-line stations or at airports where normal support is not available, the flight crew must arrange for or verify that the following steps are done:

Pressurization mode selector ..... MAN

Outflow valve ..... CLOSE

Wheel chocks ..... Check in place

Parking brake ..... Release

Protective covers and plugs ..... Install

Water storage containers ..... Drain

Toilets ..... Drain

Battery ..... Remove

If the battery will be exposed to temperatures below -18° C (0° F), the battery should be removed and stored in an area warmer than -18° C (0 ° F), but below 40° C (104° F). Subsequent installation of the warm battery ensures the starting capability of the APU.

Doors and sliding windows ..... Close

Hot Weather Operation

During ground operation the following considerations will help keep the airplane as cool as possible:

- While the airplane is electrically powered, packs should be run or cooling air supplied to the airplane when the OAT exceeds 40° C (103° F) to protect the reliability of electrical and electronic equipment in the airplane.
- If cooling air is available from an outside source, the supply should be plugged in immediately after engine shutdown and should not be removed until just prior to engine start.
- Keep all doors and windows, including cargo doors, closed as much as possible.
- Electronic components which contribute to a high temperature level in the flight deck should be turned off while not needed.
- Open all passenger cabin gasper outlets and close all window shades on the sun–exposed side of the passenger cabin.

If these actions do not reduce cabin temperatures sufficiently:

PASSENGER CABIN temperature selector ..... AUTO COOL

PACK switches ..... HIGH

If the cabin temperature remains high:

PASSENGER CABIN temperature selector ..... MAN COOL

Brake temperature levels may be reached which can cause the wheel fuse plugs to melt and deflate the tires. Consider the following actions:

- Be aware of brake temperature buildup when operating a series of short flight sectors. The energy absorbed by the brakes from each landing is accumulative
- Extending the landing gear early during the approach provides additional cooling for tires and brakes.
- In–flight cooling time can be determined from the "Brake Cooling Schedule" in the Performance–Inflight section of the QRH.

During flight planning consider the following:

- High temperatures inflict performance penalties which must be taken into account on the ground before takeoff
- Alternate takeoff procedures (No Engine Bleed Takeoff, Improved Climb Performance, etc.)

Moderate to Heavy Rain

Flights should be conducted to avoid thunderstorm or hail activity by overflight or circumnavigation. To the maximum extent possible, moderate to heavy rain should also be avoided.

If heavy rain is encountered:

ENGINE START switches ..... CONT

Thrust Levers ..... Adjust Slowly

If thrust changes are necessary, move the thrust levers slowly. Avoid changing thrust lever direction until engines have stabilized at a selected setting.

Turbulence

During flight in light to moderate turbulence, the autopilot and/or autothrottle may remain engaged unless performance is objectionable. Increased thrust lever activity can be expected when encountering wind, temperature changes and large pressure changes. Short–time airspeed excursions of 10 to 15 knots can be expected.

Passenger signs ..... ON

Advise passengers to fasten seat belts prior to entering areas of reported or anticipated turbulence. Instruct flight attendants to check that all passengers' seat belts are fastened.

Severe Turbulence

Autothrottle ..... DISENGAGE

AUTOPILOT ..... CWS

A/P status annunciators display CWS for pitch and roll.

Note: If sustained trimming occurs, disengage the autopilot.

ENGINE START switches ..... FLT

Thrust ..... Set

Set thrust as needed for the phase of flight. Change thrust setting only if needed to modify an unacceptable speed trend.

PHASE OF FLIGHT	AIRSPEED
CLIMB	280 knots or .76 Mach
CRUISE	Use FMC recommended thrust settings. If the FMC is inoperative, refer to the Unreliable Airspeed page in the Performance–Inflight section of the QRH for approximate N1 settings that maintain near optimum penetration airspeed.
DESCENT	.76 Mach/280/250 knots. If severe turbulence is encountered at altitudes below 15,000 feet and the airplane gross weight is less than the maximum landing weight, the airplane may be slowed to 250 knots in the clean configuration.

Note: If an approach must be made into an area of severe turbulence, delay flap extension as long as possible. The airplane can withstand higher gust loads in the clean configuration.

Windshear

Windshear is a change of wind speed and/or direction over a short distance along the flight path. Indications of windshear are listed in the Windshear non-normal maneuver in this manual.

Avoidance

The flight crew should search for any clues to the presence of windshear along the intended flight path. Presence of windshear may be indicated by:

- Thunderstorm activity
- Virga (rain that evaporates before reaching the ground)
- Pilot reports
- Low level windshear alerting system (LLWAS) warnings.

Stay clear of thunderstorm cells and heavy precipitation and areas of known windshear. If the presence of windshear is confirmed, delay takeoff or do not continue an approach.

Precautions

If windshear is suspected, be especially alert to any of the danger signals and be prepared for the possibility of an inadvertent encounter. The following precautionary actions are recommended if windshear is suspected:

Takeoff

- Use maximum takeoff thrust instead of reduced thrust
- For optimum takeoff performance, use flaps 5, 10 or 15 unless limited by obstacle clearance and/or climb gradient
- Use the longest suitable runway provided it is clear of areas of known windshear
- Consider increasing Vr speed to the performance limited gross weight rotation speed, not to exceed actual gross weight Vr + 20 knots. Set V speeds for the actual gross weight. Rotate at the adjusted (higher) rotation speed. This increased rotation speed results in an increased stall margin and meets takeoff performance requirements. If windshear is encountered at or beyond the actual gross weight Vr, do not attempt to accelerate to the increased Vr but rotate without hesitation
- Be alert for any airspeed fluctuations during takeoff and initial climb. Such fluctuations may be the first indication of windshear

- Know the all–engine initial climb pitch attitude. Rotate at the normal rate to this attitude for all non–engine failure takeoffs. Minimize reductions from the initial climb pitch attitude until terrain and obstruction clearance is assured, unless stick shaker activates
- Crew coordination and awareness are very important. Develop an awareness of normal values of airspeed, attitude, vertical speed, and airspeed build–up. Closely monitor vertical flight path instruments such as vertical speed and altimeters. The pilot monitoring should be especially aware of vertical flight path instruments and call out any deviations from normal
- Should airspeed fall below the trim airspeed, unusual control column forces may be needed to maintain the desired pitch attitude. Stick shaker must be respected at all times
- If windshear should be encountered near VR, and airspeed suddenly decreases, there may not be sufficient runway left to accelerate back to the normal VR. If there is insufficient runway left to stop, initiate a normal rotation at least 2000 feet before the end of the runway even if airspeed is low. Higher than normal attitudes may be needed to lift–off in the remaining runway.

Approach and Landing

- Use flaps 30 for landing
- Establish a stabilized approach no lower than 1000 feet above the airport to improve windshear recognition capability
- Use the most suitable runway that avoids the areas of suspected windshear and is compatible with crosswind or tailwind limitations. Use ILS G/S, VNAV path or VASI/PAPI indications to detect flight path deviations and help with timely detection of windshear
- If the autothrottle is disengaged, or is planned to be disengaged prior to landing, add an appropriate airspeed correction (correction applied in the same manner as gust), up to a maximum of 20 knots
- Avoid large thrust reductions or trim changes in response to sudden airspeed increases as these may be followed by airspeed decreases
- Crosscheck flight director commands using vertical flight path instruments

- Crew coordination and awareness are very important, particularly at night or in marginal weather conditions. Closely monitor the vertical flight path instruments such as vertical speed, altimeters, and glideslope displacement. The pilot monitoring should call out any deviations from normal. Use of the autopilot and autothrottle for the approach may provide more monitoring and recognition time.

Recovery

Accomplish the Windshear Escape Maneuver found in the Non–Normal Maneuvers section of this manual.

737-700 CFM56-7B20 KG JAA JAR CATA

Intentionally
Blank

Takeoff Field Corrections - Dry Runway

Slope Corrections

FIELD LENGTH AVAILABLE (FT)	SLOPE CORRECTED FIELD LENGTH (FT)								
	RUNWAY SLOPE (%)								
	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0
4200	4290	4260	4240	4220	4200	4080	3960	3840	3720
4600	4760	4720	4680	4640	4600	4450	4300	4160	4010
5000	5230	5170	5110	5060	5000	4820	4650	4470	4290
5400	5700	5620	5550	5470	5400	5190	4990	4780	4580
5800	6170	6070	5980	5890	5800	5570	5330	5100	4860
6200	6640	6530	6420	6310	6200	5940	5670	5410	5150
6600	7110	6980	6850	6730	6600	6310	6020	5730	5430
7000	7580	7430	7290	7140	7000	6680	6360	6040	5720
7400	8050	7880	7720	7560	7400	7050	6700	6350	6000
7800	8520	8340	8160	7980	7800	7420	7040	6670	6290
8200	8990	8790	8590	8400	8200	7790	7390	6980	6570
8600	9460	9240	9030	8810	8600	8160	7730	7290	6860
9000	9930	9690	9460	9230	9000	8540	8070	7610	7140
9400	10400	10150	9900	9650	9400	8910	8410	7920	7430
9800	10870	10600	10330	10070	9800	9280	8760	8240	7710
10200	11350	11060	10770	10490	10200	9650	9100	8550	8000
10600	11840	11530	11220	10910	10600	10020	9440	8860	8280
11000	12330	11990	11660	11330	11000	10390	9780	9180	8570
11400	12810	12460	12110	11750	11400	10760	10130	9490	8850
11800	13310	12930	12550	12180	11800	11130	10470	9800	9140

Wind Corrections

SLOPE CORR'D FIELD LENGTH (FT)	SLOPE & WIND CORRECTED FIELD LENGTH (FT)							
	WIND COMPONENT (KTS)							
	-15	-10	-5	0	10	20	30	40
4200	3050	3430	3820	4200	4450	4710	4960	5220
4600	3390	3790	4200	4600	4860	5130	5390	5650
5000	3730	4160	4580	5000	5270	5540	5810	6080
5400	4080	4520	4960	5400	5680	5960	6240	6520
5800	4420	4880	5340	5800	6090	6380	6660	6950
6200	4760	5240	5720	6200	6500	6790	7090	7380
6600	5100	5600	6100	6600	6900	7210	7510	7820
7000	5440	5960	6480	7000	7310	7630	7940	8250
7400	5790	6320	6860	7400	7720	8040	8360	8680
7800	6130	6690	7240	7800	8130	8460	8790	9120
8200	6470	7050	7620	8200	8540	8880	9210	9550
8600	6810	7410	8000	8600	8950	9290	9640	9980
9000	7150	7770	8380	9000	9350	9710	10060	10420
9400	7500	8130	8770	9400	9760	10130	10490	10850
9800	7840	8490	9150	9800	10170	10540	10910	11280
10200	8180	8850	9530	10200	10580	10960	11340	11720
10600	8520	9220	9910	10600	10990	11380	11760	12150
11000	8870	9580	10290	11000	11400	11790	12190	12580
11400	9210	9940	10670	11400	11800	12210	12610	13020
11800	9550	10300	11050	11800	12210	12630	13040	13450

Takeoff Field & Climb Limit Weights - Dry Runway

Flaps 5

Sea Level Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4000	54.2	50.3	50.0	49.7	49.5	49.4	49.2	49.1	44.6	43.2	41.9
4200	55.5	51.5	51.2	50.9	50.7	50.6	50.4	50.3	45.7	44.3	42.9
4600	58.1	54.0	53.7	53.3	53.2	53.0	52.8	52.7	48.0	46.5	45.1
5000	60.5	56.3	56.0	55.6	55.5	55.3	55.1	55.0	50.1	48.6	47.1
5400	62.9	58.5	58.2	57.8	57.6	57.5	57.3	57.1	52.1	50.5	49.0
5800	65.2	60.6	60.3	59.9	59.7	59.5	59.4	59.2	54.0	52.3	50.7
6200	67.3	62.6	62.2	61.9	61.7	61.5	61.3	61.1	55.7	54.0	52.4
6600	69.4	64.5	64.1	63.7	63.5	63.3	63.2	63.0	57.4	55.6	53.9
7000	71.4	66.4	66.0	65.6	65.4	65.2	65.0	64.8	59.0	57.2	55.4
7400	73.3	68.1	67.7	67.3	67.1	66.9	66.7	66.5	60.6	58.7	56.9
7800	75.2	69.9	69.4	69.0	68.8	68.6	68.4	68.2	62.1	60.1	58.3
8200	77.2	71.7	71.3	70.8	70.6	70.4	70.2	70.0	63.7	61.7	59.8
8600	79.1	73.5	73.0	72.5	72.3	72.1	71.9	71.6	65.2	63.1	61.2
9000	80.7	74.9	74.4	74.0	73.7	73.5	73.3	73.1	66.4	64.3	62.3
9400	81.6	76.1	75.7	75.2	75.0	74.7	74.5	74.3	67.6	65.4	63.4
9800	81.6	77.4	76.9	76.4	76.2	76.0	75.7	75.5	68.7	66.5	64.5
10200	81.6	78.7	78.2	77.7	77.4	77.2	77.0	76.7	69.8	67.6	65.5
10600	81.6	79.9	79.4	78.9	78.7	78.5	78.2	78.0	70.9	68.7	66.5
CLIMB LIMIT WT (1000 KG)	63.0	62.5	62.4	62.3	62.3	62.2	62.2	62.1	55.0	52.8	50.7

1000 FT Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4000	53.3	49.4	49.1	48.8	48.6	48.5	48.3	48.1	43.9	42.5	41.2
4200	54.6	50.6	50.3	50.0	49.8	49.7	49.5	49.3	45.0	43.6	42.2
4600	57.2	53.0	52.7	52.4	52.2	52.0	51.9	51.7	47.3	45.8	44.4
5000	59.6	55.3	55.0	54.6	54.5	54.3	54.2	53.9	49.3	47.8	46.4
5400	61.9	57.5	57.1	56.8	56.6	56.4	56.3	56.1	51.3	49.7	48.2
5800	64.2	59.5	59.2	58.8	58.6	58.5	58.3	58.1	53.1	51.5	49.9
6200	66.3	61.5	61.1	60.7	60.6	60.4	60.2	60.0	54.9	53.2	51.5
6600	68.3	63.3	63.0	62.6	62.4	62.2	62.0	61.8	56.5	54.8	53.1
7000	70.3	65.1	64.8	64.4	64.2	64.0	63.8	63.5	58.1	56.3	54.5
7400	72.2	66.9	66.5	66.1	65.9	65.7	65.5	65.2	59.6	57.8	56.0
7800	74.0	68.6	68.2	67.8	67.6	67.4	67.1	66.9	61.1	59.2	57.3
8200	76.0	70.4	69.9	69.5	69.3	69.1	68.9	68.6	62.7	60.7	58.8
8600	77.8	72.1	71.6	71.2	71.0	70.8	70.6	70.3	64.2	62.1	60.2
9000	79.4	73.5	73.0	72.6	72.4	72.2	71.9	71.7	65.4	63.3	61.3
9400	80.7	74.7	74.3	73.8	73.6	73.4	73.1	72.9	66.5	64.4	62.4
9800	81.6	75.9	75.5	75.0	74.8	74.6	74.4	74.1	67.6	65.5	63.4
10200	81.6	77.2	76.7	76.3	76.0	75.8	75.6	75.3	68.7	66.6	64.5
10600	81.6	78.4	78.0	77.5	77.3	77.0	76.8	76.5	69.8	67.6	65.5
CLIMB LIMIT WT (1000 KG)	62.7	62.1	62.1	62.0	61.9	61.9	61.8	61.7	54.8	52.5	50.4

With engine bleed for packs off, increase field limit weight by 550 kg and climb limit weight by 1200 kg.
With engine anti-ice on, decrease field limit weight by 150 kg and climb limit weight by 150 kg.
With engine and wing anti-ice on (optional system), decrease field limit weight by 550 kg and climb limit weight by 750 kg.

Takeoff Field & Climb Limit Weights - Dry Runway
Flaps 5
2000 FT Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4000	52.5	48.5	48.2	47.9	47.8	47.6	47.5	47.2	43.1	41.7	40.5
4200	53.8	49.7	49.4	49.1	48.9	48.8	48.7	48.4	44.2	42.8	41.5
4600	56.3	52.1	51.8	51.5	51.3	51.2	51.0	50.8	46.4	45.0	43.6
5000	58.7	54.3	54.0	53.7	53.6	53.4	53.2	53.0	48.5	47.0	45.6
5400	61.0	56.5	56.1	55.8	55.7	55.5	55.3	55.1	50.4	48.8	47.4
5800	63.2	58.5	58.2	57.8	57.7	57.5	57.3	57.0	52.2	50.6	49.1
6200	65.3	60.4	60.1	59.7	59.5	59.4	59.2	58.9	53.9	52.2	50.7
6600	67.3	62.3	61.9	61.5	61.3	61.2	61.0	60.7	55.5	53.8	52.2
7000	69.2	64.0	63.6	63.3	63.1	62.9	62.7	62.4	57.1	55.3	53.6
7400	71.1	65.7	65.3	64.9	64.8	64.6	64.4	64.1	58.5	56.7	55.0
7800	72.9	67.4	67.0	66.6	66.4	66.2	66.0	65.7	60.0	58.1	56.4
8200	74.9	69.2	68.7	68.3	68.1	67.9	67.7	67.4	61.5	59.6	57.8
8600	76.7	70.8	70.4	70.0	69.8	69.6	69.3	69.0	63.0	61.0	59.1
9000	78.2	72.2	71.8	71.3	71.1	70.9	70.7	70.3	64.2	62.2	60.3
9400	79.5	73.4	73.0	72.5	72.3	72.1	71.9	71.5	65.3	63.2	61.3
9800	80.8	74.6	74.2	73.7	73.5	73.3	73.1	72.7	66.4	64.3	62.3
10200	81.6	75.8	75.4	74.9	74.7	74.5	74.3	73.9	67.5	65.4	63.4
10600	81.6	77.1	76.6	76.1	75.9	75.7	75.5	75.1	68.5	66.4	64.3
CLIMB LIMIT WT (1000 KG)	62.4	61.9	61.8	61.8	61.7	61.7	61.6	61.4	54.3	52.0	49.9

3000 FT Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4000	51.5	47.5	47.2	46.9	46.8	46.6	46.5	46.2	42.3	41.0	39.8
4200	52.7	48.7	48.4	48.1	47.9	47.8	47.6	47.4	43.4	42.1	40.9
4600	55.2	51.0	50.7	50.4	50.3	50.1	50.0	49.7	45.6	44.2	42.9
5000	57.6	53.2	52.9	52.6	52.5	52.3	52.2	51.9	47.6	46.2	44.9
5400	59.9	55.3	55.0	54.7	54.5	54.4	54.2	53.9	49.5	48.0	46.6
5800	62.0	57.3	57.0	56.7	56.5	56.3	56.1	55.8	51.3	49.8	48.3
6200	64.0	59.2	58.8	58.5	58.3	58.2	58.0	57.6	52.9	51.4	49.9
6600	66.0	61.0	60.6	60.3	60.1	59.9	59.7	59.4	54.5	52.9	51.4
7000	67.9	62.7	62.3	62.0	61.8	61.6	61.4	61.1	56.0	54.4	52.8
7400	69.7	64.4	64.0	63.6	63.4	63.2	63.0	62.7	57.5	55.8	54.2
7800	71.5	66.0	65.6	65.2	65.0	64.8	64.6	64.3	58.9	57.2	55.5
8200	73.4	67.7	67.3	66.9	66.7	66.5	66.3	65.9	60.4	58.6	56.9
8600	75.2	69.3	68.9	68.5	68.3	68.1	67.9	67.5	61.8	60.0	58.2
9000	76.6	70.7	70.3	69.9	69.6	69.4	69.2	68.8	63.0	61.1	59.3
9400	77.9	71.9	71.4	71.0	70.8	70.6	70.4	70.0	64.1	62.2	60.3
9800	79.2	73.1	72.6	72.2	72.0	71.8	71.5	71.1	65.2	63.2	61.4
10200	80.5	74.3	73.8	73.4	73.2	72.9	72.7	72.3	66.3	64.3	62.4
10600	81.6	75.5	75.0	74.6	74.3	74.1	73.9	73.4	67.3	65.2	63.3
CLIMB LIMIT WT (1000 KG)	61.8	61.4	61.3	61.2	61.2	61.1	61.1	60.7	53.8	51.6	49.6

With engine bleed for packs off, increase field limit weight by 550 kg and climb limit weight by 1200 kg.
With engine anti-ice on, decrease field limit weight by 150 kg and climb limit weight by 150 kg.
With engine and wing anti-ice on (optional system), decrease field limit weight by 550 kg and climb limit weight by 750 kg.

Takeoff Field Corrections - Wet Runway

Slope Corrections

FIELD LENGTH AVAILABLE (FT)	SLOPE CORRECTED FIELD LENGTH (FT)								
	RUNWAY SLOPE (%)								
	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0
4200	4280	4260	4240	4220	4200	4110	4030	3940	3850
4600	4750	4710	4670	4640	4600	4490	4380	4270	4160
5000	5210	5160	5100	5050	5000	4870	4730	4600	4470
5400	5670	5600	5540	5470	5400	5240	5090	4930	4770
5800	6140	6050	5970	5880	5800	5620	5440	5260	5080
6200	6600	6500	6400	6300	6200	6000	5790	5590	5390
6600	7060	6950	6830	6720	6600	6370	6150	5920	5690
7000	7530	7390	7260	7130	7000	6750	6500	6250	6000
7400	7990	7840	7690	7550	7400	7120	6840	6560	6280
7800	8450	8290	8130	7960	7800	7490	7180	6870	6560
8200	8920	8740	8560	8380	8200	7860	7520	7180	6840
8600	9380	9180	8990	8790	8600	8230	7860	7490	7120
9000	9840	9630	9420	9210	9000	8600	8200	7800	7400
9400	10310	10080	9850	9630	9400	8970	8540	8110	7680
9800	10770	10530	10280	10040	9800	9340	8880	8420	7960
10200	11250	10990	10730	10460	10200	9710	9220	8730	8240
10600	11750	11460	11180	10890	10600	10080	9560	9040	8520
11000	12250	11940	11630	11310	11000	10450	9900	9350	8800
11400	12750	12410	12080	11740	11400	10820	10240	9660	9080
11800	13250	12890	12530	12160	11800	11190	10580	9970	9360

Wind Corrections

SLOPE CORR'D FIELD LENGTH (FT)	SLOPE & WIND CORRECTED FIELD LENGTH (FT)							
	WIND COMPONENT (KTS)							
	-15	-10	-5	0	10	20	30	40
4200	2960	3370	3790	4200	4480	4770	5070	5380
4600	3290	3730	4160	4600	4890	5200	5510	5830
5000	3630	4080	4540	5000	5310	5620	5940	6280
5400	3960	4440	4920	5400	5720	6040	6380	6720
5800	4300	4800	5300	5800	6130	6460	6810	7170
6200	4630	5150	5680	6200	6540	6890	7250	7610
6600	4970	5510	6060	6600	6950	7310	7680	8060
7000	5300	5870	6430	7000	7360	7730	8110	8510
7400	5640	6230	6810	7400	7770	8150	8550	8950
7800	5970	6580	7190	7800	8180	8580	8980	9400
8200	6310	6940	7570	8200	8590	9000	9420	9850
8600	6640	7300	7950	8600	9000	9420	9850	10290
9000	6980	7650	8330	9000	9410	9840	10280	10740
9400	7310	8010	8700	9400	9830	10270	10720	11190
9800	7650	8370	9080	9800	10240	10690	11150	11630
10200	7980	8720	9460	10200	10650	11110	11590	12080
10600	8320	9080	9840	10600	11060	11530	12020	12530
11000	8650	9440	10220	11000	11470	11950	12460	12970
11400	8990	9790	10600	11400	11880	12380	12890	13420
11800	9320	10150	10970	11800	12290	12800	13320	13860

Takeoff Field & Climb Limit Weights - Wet Runway
Flaps 5
Sea Level Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4300	56.7	51.6	51.2	50.9	50.7	50.5	50.3	50.2	46.2	45.0	43.8
4600	58.7	53.4	53.0	52.7	52.5	52.3	52.1	51.9	47.8	46.5	45.3
5000	61.2	55.7	55.3	54.9	54.7	54.5	54.3	54.1	49.8	48.4	47.2
5400	63.6	57.8	57.4	57.0	56.8	56.6	56.4	56.2	51.7	50.3	48.9
5800	65.8	59.8	59.4	59.0	58.8	58.6	58.4	58.2	53.5	52.0	50.7
6200	67.9	61.8	61.3	60.9	60.7	60.5	60.3	60.0	55.2	53.7	52.3
6600	70.0	63.6	63.1	62.7	62.5	62.3	62.0	61.8	56.8	55.3	53.8
7000	71.9	65.4	64.9	64.5	64.2	64.0	63.8	63.6	58.4	56.8	55.3
7400	73.9	67.1	66.7	66.2	66.0	65.7	65.5	65.3	60.0	58.3	56.8
7800	75.8	68.9	68.4	67.9	67.7	67.4	67.2	66.9	61.5	59.8	58.2
8200	77.8	70.6	70.1	69.6	69.4	69.1	68.9	68.6	63.0	61.3	59.6
8600	79.6	72.3	71.8	71.3	71.0	70.8	70.5	70.3	64.5	62.7	61.0
9000	81.3	73.8	73.3	72.7	72.5	72.2	72.0	71.7	65.8	64.0	62.2
9400	81.6	75.2	74.6	74.1	73.8	73.6	73.3	73.0	67.0	65.2	63.4
9800	81.6	76.5	76.0	75.4	75.2	74.9	74.6	74.4	68.3	66.4	64.6
10200	81.6	77.9	77.4	76.8	76.5	76.3	76.0	75.7	69.5	67.6	65.7
10600	81.6	79.3	78.8	78.2	77.9	77.7	77.4	77.1	70.7	68.7	66.8
11000	81.6	80.8	80.2	79.6	79.3	79.0	78.7	78.4	71.9	69.9	68.0
CLIMB LIMIT WT (1000 KG)	63.0	62.5	62.4	62.3	62.3	62.2	62.2	62.1	55.0	52.8	50.7

1000 FT Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4300	55.6	50.5	50.2	49.8	49.7	49.5	49.3	49.1	45.3	44.1	42.9
4600	57.6	52.3	51.9	51.6	51.4	51.2	51.1	50.8	46.9	45.6	44.4
5000	60.1	54.5	54.1	53.8	53.6	53.4	53.2	53.0	48.8	47.5	46.2
5400	62.4	56.6	56.2	55.8	55.6	55.4	55.2	55.0	50.7	49.3	48.0
5800	64.6	58.6	58.2	57.8	57.6	57.4	57.2	56.9	52.5	51.0	49.7
6200	66.6	60.5	60.0	59.6	59.4	59.2	59.0	58.8	54.1	52.7	51.2
6600	68.6	62.3	61.8	61.4	61.2	61.0	60.8	60.5	55.7	54.2	52.7
7000	70.6	64.0	63.6	63.1	62.9	62.7	62.5	62.2	57.3	55.7	54.2
7400	72.5	65.7	65.3	64.8	64.6	64.4	64.1	63.9	58.8	57.2	55.6
7800	74.4	67.4	66.9	66.5	66.2	66.0	65.8	65.5	60.3	58.6	57.0
8200	76.3	69.1	68.6	68.1	67.9	67.7	67.4	67.1	61.8	60.1	58.4
8600	78.1	70.7	70.2	69.8	69.5	69.3	69.0	68.7	63.2	61.5	59.8
9000	79.7	72.2	71.7	71.2	70.9	70.7	70.5	70.1	64.5	62.7	61.0
9400	81.2	73.5	73.0	72.5	72.3	72.0	71.8	71.4	65.7	63.9	62.1
9800	81.6	74.9	74.4	73.8	73.6	73.3	73.1	72.7	66.9	65.1	63.3
10200	81.6	76.3	75.7	75.2	74.9	74.7	74.4	74.1	68.1	66.2	64.4
10600	81.6	77.6	77.1	76.5	76.3	76.0	75.7	75.4	69.3	67.4	65.5
11000	81.6	79.0	78.4	77.9	77.6	77.3	77.1	76.7	70.5	68.5	66.6
CLIMB LIMIT WT (1000 KG)	62.7	62.1	62.1	62.0	61.9	61.9	61.8	61.7	54.8	52.5	50.4

With engine bleed for packs off, increase field limit weight by 550 kg and climb limit weight by 1200 kg.
With engine anti-ice on, decrease field limit weight by 150 kg and climb limit weight by 150 kg.
With engine and wing anti-ice on (optional system), decrease field limit weight by 450 kg and climb limit weight by 750 kg.

Takeoff Field & Climb Limit Weights - Wet Runway

Flaps 5

2000 FT Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4300	54.6	49.5	49.2	48.8	48.7	48.5	48.4	48.1	44.4	43.2	42.1
4600	56.6	51.3	50.9	50.6	50.4	50.2	50.0	49.8	45.9	44.6	43.5
5000	59.0	53.4	53.1	52.7	52.5	52.3	52.2	51.9	47.8	46.5	45.3
5400	61.2	55.5	55.1	54.7	54.5	54.3	54.1	53.9	49.6	48.3	47.0
5800	63.4	57.4	57.0	56.6	56.4	56.2	56.0	55.7	51.3	50.0	48.6
6200	65.4	59.3	58.8	58.4	58.2	58.0	57.8	57.5	53.0	51.5	50.2
6600	67.4	61.0	60.6	60.2	60.0	59.8	59.5	59.2	54.5	53.1	51.7
7000	69.3	62.7	62.3	61.9	61.6	61.4	61.2	60.9	56.1	54.5	53.1
7400	71.2	64.4	64.0	63.5	63.3	63.1	62.9	62.5	57.6	56.0	54.5
7800	73.0	66.0	65.6	65.1	64.9	64.7	64.5	64.1	59.0	57.4	55.9
8200	74.9	67.7	67.2	66.8	66.5	66.3	66.1	65.7	60.4	58.8	57.2
8600	76.7	69.3	68.8	68.3	68.1	67.9	67.6	67.2	61.8	60.1	58.5
9000	78.3	70.7	70.2	69.7	69.5	69.3	69.0	68.6	63.1	61.4	59.7
9400	79.7	72.1	71.5	71.0	70.8	70.5	70.3	69.9	64.3	62.5	60.8
9800	81.2	73.4	72.8	72.3	72.1	71.8	71.6	71.2	65.5	63.6	61.9
10200	81.6	74.7	74.2	73.6	73.4	73.1	72.9	72.5	66.6	64.8	63.0
10600	81.6	76.0	75.5	75.0	74.7	74.4	74.2	73.8	67.8	65.9	64.1
11000	81.6	77.4	76.8	76.3	76.0	75.7	75.5	75.0	68.9	67.0	65.1
CLIMB LIMIT WT (1000 KG)	62.4	61.9	61.8	61.8	61.7	61.7	61.6	61.4	54.3	52.0	49.9

3000 FT Pressure Altitude

CORR'D FIELD LENGTH (FT)	FIELD LIMIT WEIGHT (1000 KG)										
	OAT (°C)										
	-40	14	18	22	24	26	28	30	42	46	50
4300	53.4	48.4	48.0	47.7	47.6	47.4	47.2	47.0	43.4	42.3	41.3
4600	55.3	50.1	49.7	49.4	49.2	49.0	48.9	48.6	44.9	43.7	42.6
5000	57.6	52.2	51.8	51.5	51.3	51.1	50.9	50.6	46.8	45.6	44.4
5400	59.8	54.2	53.8	53.4	53.2	53.1	52.9	52.6	48.6	47.3	46.1
5800	61.9	56.1	55.7	55.3	55.1	54.9	54.7	54.4	50.3	48.9	47.7
6200	63.9	57.9	57.5	57.1	56.9	56.7	56.5	56.1	51.9	50.5	49.2
6600	65.8	59.6	59.2	58.8	58.6	58.3	58.2	57.8	53.4	52.0	50.7
7000	67.7	61.3	60.8	60.4	60.2	60.0	59.8	59.4	54.9	53.4	52.1
7400	69.5	62.9	62.4	62.0	61.8	61.6	61.4	61.0	56.3	54.8	53.4
7800	71.3	64.5	64.0	63.6	63.4	63.1	62.9	62.6	57.7	56.2	54.8
8200	73.1	66.1	65.6	65.2	64.9	64.7	64.5	64.1	59.1	57.6	56.1
8600	74.9	67.6	67.2	66.7	66.5	66.2	66.0	65.6	60.5	58.9	57.4
9000	76.4	69.0	68.6	68.1	67.8	67.6	67.4	67.0	61.7	60.1	58.5
9400	77.8	70.3	69.8	69.3	69.1	68.9	68.6	68.2	62.9	61.2	59.6
9800	79.2	71.6	71.1	70.6	70.4	70.1	69.9	69.4	64.0	62.3	60.7
10200	80.7	72.9	72.4	71.9	71.6	71.4	71.1	70.7	65.2	63.4	61.8
10600	81.6	74.2	73.7	73.2	72.9	72.6	72.4	72.0	66.3	64.5	62.8
11000	81.6	75.5	75.0	74.4	74.2	73.9	73.6	73.2	67.4	65.6	63.8
CLIMB LIMIT WT (1000 KG)	61.8	61.4	61.3	61.2	61.2	61.1	61.1	60.7	53.8	51.6	49.6

With engine bleed for packs off, increase field limit weight by 550 kg and climb limit weight by 1200 kg.
With engine anti-ice on, decrease field limit weight by 150 kg and climb limit weight by 150 kg.
With engine and wing anti-ice on (optional system), decrease field limit weight by 450 kg and climb limit weight by 750 kg.

Takeoff Obstacle Limit Weight

Flaps 5

Sea Level 30°C & Below, Zero Wind

Based on engine bleed for packs on and anti-ice off

Reference Obstacle Limit Weight (1000 KG)

OBSTACLE HEIGHT (FT)	DISTANCE FROM BRAKE RELEASE (1000 FT)								
	8	10	12	14	16	18	20	22	24
10	62.8	66.1							
50	57.8	61.9	64.1	65.8	66.9				
100	53.7	57.8	60.7	62.7	64.1	65.2	66.0	66.7	67.3
150	50.6	54.7	57.8	60.1	61.8	63.0	64.0	64.8	65.5
200	48.0	52.2	55.3	57.8	59.6	61.1	62.3	63.2	64.0
250	45.8	50.0	53.2	55.8	57.7	59.3	60.6	61.7	62.6
300	43.9	48.1	51.4	54.0	56.0	57.7	59.1	60.3	61.3
350	42.1	46.4	49.7	52.3	54.5	56.2	57.7	58.9	60.0
400		44.8	48.2	50.8	53.0	54.8	56.4	57.7	58.8
450		43.4	46.7	49.5	51.7	53.6	55.1	56.5	57.6
500		42.1	45.4	48.2	50.4	52.4	54.0	55.4	56.6
550		40.8	44.2	47.0	49.3	51.2	52.9	54.3	55.6
600			43.1	45.9	48.2	50.2	51.8	53.3	54.6
650			42.0	44.8	47.1	49.1	50.9	52.3	53.7
700			41.0	43.8	46.2	48.2	49.9	51.4	52.8
750				42.8	45.2	47.3	49.0	50.6	51.9
800				41.9	44.3	46.4	48.2	49.7	51.1
850				41.1	43.5	45.5	47.3	48.9	50.3
900					42.7	44.7	46.6	48.2	49.6
950					41.9	44.0	45.8	47.4	48.8
1000					41.1	43.2	45.1	46.7	48.1

When using line-up allowances, the obstacle distance from brake release must be reduced by the ASDA adjustment.

Obstacle height must be calculated from lowest point of the runway to conservatively account for runway slope.

OAT Adjustments

OAT (°C)	REFERENCE OBSTACLE LIMIT WEIGHT (1000 KG)							
	42	46	50	54	58	62	66	70
30 & BELOW	0	0	0	0	0	0	0	0
32	-0.8	-0.9	-1.0	-1.0	-1.1	-1.2	-1.3	-1.4
34	-1.6	-1.7	-1.9	-2.1	-2.2	-2.4	-2.6	-2.7
36	-2.4	-2.6	-2.9	-3.1	-3.4	-3.6	-3.9	-4.1
38	-3.2	-3.5	-3.8	-4.2	-4.5	-4.8	-5.2	-5.5
40	-4.0	-4.4	-4.8	-5.2	-5.6	-6.0	-6.4	-6.9
42	-4.7	-5.2	-5.7	-6.1	-6.6	-7.1	-7.6	-8.1
44	-5.4	-6.0	-6.5	-7.1	-7.7	-8.2	-8.8	-9.4
46	-6.1	-6.7	-7.4	-8.0	-8.7	-9.3	-10.0	-10.6
48	-6.8	-7.5	-8.3	-9.0	-9.7	-10.4	-11.2	-11.9
50	-7.5	-8.3	-9.1	-9.9	-10.7	-11.6	-12.4	-13.2

Takeoff Obstacle Limit Weight

Flaps 5

Sea Level 30°C & Below, Zero Wind

Based on engine bleed for packs on and anti-ice off

Pressure Altitude Adjustments

ALT (FT)	OAT ADJUSTED OBSTACLE LIMIT WEIGHT (1000 KG)							
	42	46	50	54	58	62	66	70
S.L.& BELOW	0	0	0	0	0	0	0	0
1000	-0.8	-0.8	-0.8	-0.8	-0.8	-0.9	-0.9	-0.9
2000	-1.6	-1.6	-1.6	-1.7	-1.7	-1.7	-1.8	-1.8
3000	-2.5	-2.5	-2.6	-2.7	-2.7	-2.8	-2.8	-2.9
4000	-3.4	-3.5	-3.6	-3.7	-3.7	-3.8	-3.9	-4.0
5000	-5.0	-5.2	-5.4	-5.6	-5.8	-6.0	-6.3	-6.5
6000	-6.5	-6.9	-7.2	-7.6	-7.9	-8.3	-8.6	-9.0
7000	-8.3	-8.8	-9.4	-9.9	-10.5	-11.0	-11.6	-12.1
8000	-10.0	-10.8	-11.5	-12.3	-13.0	-13.7	-14.5	-15.2
9000	-11.5	-12.5	-13.6	-14.6	-15.7	-16.7	-17.7	-18.8
10000	-13.0	-14.3	-15.6	-17.0	-18.3	-19.7	-21.0	-22.3

Wind Adjustments

WIND (KTS)	OAT & ALT ADJUSTED OBSTACLE LIMIT WEIGHT (1000 KG)							
	42	46	50	54	58	62	66	70
15 TW	-6.9	-6.5	-6.2	-5.8	-5.5	-5.1	-4.8	-4.5
10 TW	-4.6	-4.3	-4.1	-3.9	-3.7	-3.4	-3.2	-3.0
5 TW	-2.3	-2.2	-2.1	-1.9	-1.8	-1.7	-1.6	-1.5
0	0	0	0	0	0	0	0	0
10 HW	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.3
20 HW	1.8	1.6	1.5	1.3	1.1	1.0	0.8	0.6
30 HW	2.7	2.5	2.2	2.0	1.7	1.5	1.2	0.9
40 HW	3.7	3.3	3.0	2.6	2.3	2.0	1.6	1.3

With engine bleed for packs off, increase weight by 900 kg.
With engine anti-ice on, decrease weight by 200 kg.
With engine and wing anti-ice on, decrease weight by 850 kg (optional system).

Long Range Cruise Maximum Operating Altitude

Max Cruise Thrust

ISA + 10°C and Below

WEIGHT (1000 KG)	OPTIMUM ALT (FT)	TAT (°C)	MARGIN TO INITIAL BUFFET 'G' (BANK ANGLE)				
			1.20 (33°)	1.25 (36°)	1.30 (39°)	1.40 (44°)	1.50 (48°)
80	31000	-8	34400*	34400*	34300	32700	31300
75	32400	-11	35900*	35900*	35600	34100	32700
70	33900	-14	37300*	37300*	37100	35500	34200
65	35500	-18	38700*	38700*	38600	37100	35700
60	37100	-19	40200*	40200*	40200*	38800	37400
55	39000	-19	41000	41000	41000	40600	39200
50	40900	-19	41000	41000	41000	41000	41000
45	41000	-19	41000	41000	41000	41000	41000
40	41000	-19	41000	41000	41000	41000	41000
35	41000	-19	41000	41000	41000	41000	41000
30	41000	-19	41000	41000	41000	41000	41000

ISA + 15°C

WEIGHT (1000 KG)	OPTIMUM ALT (FT)	TAT (°C)	MARGIN TO INITIAL BUFFET 'G' (BANK ANGLE)				
			1.20 (33°)	1.25 (36°)	1.30 (39°)	1.40 (44°)	1.50 (48°)
80	31000	-2	33100*	33100*	33100*	32700	31300
75	32400	-5	34900*	34900*	34900*	34100	32700
70	33900	-8	36400*	36400*	36400*	35500	34200
65	35500	-12	37900*	37900*	37900*	37100	35700
60	37100	-13	39400*	39400*	39400*	38800	37400
55	39000	-13	40900*	40900*	40900*	40600	39200
50	40900	-13	41000	41000	41000	41000	41000
45	41000	-13	41000	41000	41000	41000	41000
40	41000	-13	41000	41000	41000	41000	41000
35	41000	-13	41000	41000	41000	41000	41000
30	41000	-13	41000	41000	41000	41000	41000

ISA + 20°C

WEIGHT (1000 KG)	OPTIMUM ALT (FT)	TAT (°C)	MARGIN TO INITIAL BUFFET 'G' (BANK ANGLE)				
			1.20 (33°)	1.25 (36°)	1.30 (39°)	1.40 (44°)	1.50 (48°)
80	31000	4	30800*	30800*	30800*	30800*	30800*
75	32400	0	33300*	33300*	33300*	33300*	32700
70	33900	-3	35200*	35200*	35200*	35200*	34200
65	35500	-6	36800*	36800*	36800*	36800*	35700
60	37100	-8	38300*	38300*	38300*	38300*	37400
55	39000	-8	39800*	39800*	39800*	39800*	39200
50	40900	-8	41000	41000	41000	41000	41000
45	41000	-8	41000	41000	41000	41000	41000
40	41000	-8	41000	41000	41000	41000	41000
35	41000	-8	41000	41000	41000	41000	41000
30	41000	-8	41000	41000	41000	41000	41000

***Denotes altitude thrust limited in level flight, 100 fpm residual rate of climb.**

Long Range Cruise Trip Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
275	256	239	224	212	200	190	181	173	166	159
544	508	475	447	423	400	381	364	349	334	322
812	759	712	670	633	600	573	548	524	503	484
1081	1011	948	893	844	800	764	731	700	672	647
1348	1262	1184	1116	1055	1000	956	914	876	842	810
1614	1512	1419	1338	1266	1200	1147	1098	1052	1011	973
1880	1761	1654	1560	1476	1400	1338	1281	1228	1180	1136
2145	2011	1889	1782	1687	1600	1530	1464	1404	1349	1299
2409	2259	2123	2004	1897	1800	1721	1648	1580	1518	1462
2673	2507	2357	2225	2107	2000	1913	1831	1756	1688	1625
2936	2755	2591	2446	2317	2200	2104	2015	1932	1857	1788
3198	3002	2824	2667	2528	2400	2295	2198	2108	2026	1952
3460	3248	3057	2888	2738	2600	2487	2382	2285	2196	2115
3721	3495	3289	3109	2947	2800	2678	2565	2461	2365	2278
3982	3741	3522	3329	3157	3000	2870	2749	2637	2535	2442
4242	3986	3754	3550	3367	3200	3062	2933	2814	2705	2606
4501	4232	3987	3770	3577	3400	3253	3117	2991	2875	2770
4760	4477	4219	3991	3787	3600	3445	3301	3167	3045	2933
5019	4721	4451	4211	3996	3800	3637	3485	3344	3215	3097
5278	4966	4682	4431	4206	4000	3828	3668	3521	3385	3261
5536	5210	4914	4651	4416	4200	4020	3852	3697	3555	3425
5794	5455	5145	4871	4625	4400	4211	4036	3874	3725	3589
6052	5698	5376	5091	4835	4600	4403	4220	4050	3894	3752
6310	5942	5607	5310	5044	4800	4594	4403	4227	4064	3916
6567	6185	5838	5530	5253	5000	4786	4587	4403	4234	4080

Long Range Cruise Trip Fuel and Time

Reference Fuel and Time Required

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	29		31		33		35		37	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	1.3	0:38	1.3	0:37	1.3	0:36	1.3	0:36	1.4	0:36
400	2.3	1:09	2.3	1:08	2.2	1:07	2.2	1:05	2.2	1:04
600	3.3	1:41	3.2	1:39	3.2	1:37	3.1	1:35	3.1	1:33
800	4.3	2:13	4.2	2:10	4.1	2:07	4.0	2:04	3.9	2:01
1000	5.2	2:44	5.1	2:41	5.0	2:37	4.9	2:33	4.8	2:29
1200	6.3	3:15	6.1	3:10	6.0	3:06	5.8	3:01	5.7	2:57
1400	7.3	3:46	7.1	3:40	6.9	3:35	6.7	3:29	6.6	3:24
1600	8.3	4:16	8.1	4:10	7.9	4:04	7.7	3:57	7.5	3:52
1800	9.3	4:47	9.1	4:40	8.8	4:33	8.6	4:26	8.4	4:20
2000	10.4	5:18	10.1	5:10	9.8	5:02	9.5	4:54	9.3	4:48
2200	11.4	5:47	11.1	5:39	10.8	5:30	10.5	5:22	10.2	5:15
2400	12.5	6:17	12.2	6:07	11.8	5:58	11.5	5:49	11.2	5:42
2600	13.6	6:46	13.2	6:36	12.8	6:26	12.4	6:17	12.1	6:10
2800	14.7	7:16	14.2	7:05	13.8	6:54	13.4	6:45	13.1	6:37
3000	15.7	7:45	15.3	7:33	14.8	7:22	14.4	7:12	14.0	7:04
3200	16.9	8:14	16.4	8:01	15.9	7:49	15.4	7:39	15.1	7:31
3400	18.0	8:42	17.5	8:29	16.9	8:17	16.4	8:07	16.1	7:58
3600	19.1	9:10	18.6	8:57	18.0	8:44	17.5	8:34	17.1	8:25
3800	20.3	9:39	19.7	9:24	19.1	9:12	18.5	9:01	18.1	8:52
4000	21.4	10:07	20.8	9:52	20.1	9:39	19.5	9:28	19.1	9:19
4200	22.6	10:34	21.9	10:19	21.2	10:06	20.6	9:55	20.2	9:45
4400	23.8	11:02	23.1	10:47	22.4	10:33	21.7	10:22	21.3	10:12
4600	25.0	11:29	24.2	11:14	23.5	11:00	22.8	10:49	22.4	10:39
4800	26.2	11:57	25.4	11:41	24.6	11:27	23.9	11:15	23.5	11:05
5000	27.4	12:24	26.5	12:08	25.7	11:54	25.0	11:42	24.6	11:32

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	LANDING WEIGHT (1000 KG)				
	30	40	45	50	60
5	-0.7	-0.3	0.0	0.3	1.1
10	-1.4	-0.5	0.0	0.7	2.4
15	-2.1	-0.8	0.0	1.1	4.0
20	-2.9	-1.1	0.0	1.6	6.0
25	-3.7	-1.3	0.0	2.2	8.2
30	-4.6	-1.6	0.0	2.8	10.7

Based on 280/.78 climb, Long Range Cruise and .78/280/250 descent.

Long Range Cruise Step Climb

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
1320	1241	1170	1107	1051	1000	954	912	873	838	805
1837	1729	1633	1547	1470	1400	1336	1278	1225	1176	1131
2354	2217	2096	1987	1889	1800	1719	1645	1577	1515	1457
2870	2705	2558	2427	2308	2200	2102	2012	1930	1854	1784
3386	3193	3021	2866	2727	2600	2485	2379	2282	2193	2110
3902	3680	3483	3306	3145	3000	2867	2746	2635	2532	2437
4417	4168	3945	3745	3564	3400	3250	3113	2987	2871	2764
4932	4655	4407	4184	3983	3800	3633	3480	3340	3211	3091
5447	5141	4869	4623	4401	4200	4016	3848	3693	3550	3418
5961	5628	5330	5062	4820	4600	4399	4215	4046	3890	3745
6475	6114	5791	5501	5239	5000	4782	4583	4399	4229	4072

Trip Fuel and Time Required

AIR DIST (NM)	TRIP FUEL (1000 KG) LANDING WEIGHT (1000 KG)					TIME (HRS:MIN)
	30	40	50	60	70	
1000	3.8	4.4	5.1	5.9	6.6	2:28
1400	5.2	6.0	7.0	8.1	9.1	3:23
1800	6.5	7.6	8.9	10.3	11.7	4:17
2200	8.0	9.3	10.9	12.7	14.4	5:12
2600	9.4	11.0	12.9	15.0	17.1	6:06
3000	10.9	12.7	15.1	17.5	20.0	7:00
3400	12.4	14.5	17.2	20.0	22.9	7:53
3800	14.0	16.4	19.5	22.7	25.9	8:47
4200	15.6	18.3	21.8	25.4	29.0	9:40
4600	17.2	20.3	24.2	28.1	32.2	10:34
5000	18.8	22.3	26.6	31.0	35.4	11:27

Based on 280/.78 climb, Long Range Cruise or .78 cruise and .78/280/250 descent.
Valid for all pressure altitudes with 4000 ft step climb to 2000 ft above optimum altitude.

Short Trip Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
92	79	69	61	55	50	46	42	39	37	34
158	142	128	117	108	100	93	87	82	77	73
224	204	187	173	161	150	141	133	125	119	113
288	265	245	228	213	200	188	178	169	161	153
351	325	302	283	265	250	236	224	213	203	194
415	385	360	337	318	300	284	270	257	246	235
478	445	417	392	370	350	332	316	302	288	276
541	506	474	447	422	400	380	362	346	331	317
606	567	532	502	474	450	428	408	390	373	358
672	629	591	557	527	500	476	453	433	415	398

Trip Fuel and Time Required

AIR DIST (NM)		LANDING WEIGHT (1000 KG) 30	40	50	60	70	TIME (HRS:MIN)
50	FUEL (1000 KG)	0.5	0.5	0.6	0.6	0.7	0:14
	ALT (FT)	13000	11000	11000	9000	9000	
100	FUEL (1000 KG)	0.7	0.8	0.9	1.0	1.1	0:22
	ALT (FT)	21000	19000	19000	17000	17000	
150	FUEL (1000 KG)	0.9	1.1	1.2	1.3	1.4	0:30
	ALT (FT)	29000	25000	25000	23000	23000	
200	FUEL (1000 KG)	1.1	1.3	1.5	1.6	1.8	0:37
	ALT (FT)	41000	35000	29000	27000	25000	
250	FUEL (1000 KG)	1.3	1.5	1.7	1.9	2.1	0:44
	ALT (FT)	41000	41000	37000	31000	29000	
300	FUEL (1000 KG)	1.4	1.7	1.9	2.1	2.4	0:50
	ALT (FT)	41000	41000	39000	35000	31000	
350	FUEL (1000 KG)	1.6	1.9	2.1	2.4	2.7	0:57
	ALT (FT)	41000	41000	39000	35000	33000	
400	FUEL (1000 KG)	1.8	2.1	2.4	2.7	3.0	1:04
	ALT (FT)	41000	41000	39000	35000	33000	
450	FUEL (1000 KG)	1.9	2.2	2.6	2.9	3.3	1:11
	ALT (FT)	41000	41000	39000	35000	33000	
500	FUEL (1000 KG)	2.1	2.4	2.8	3.2	3.6	1:19
	ALT (FT)	41000	41000	39000	35000	33000	

Holding Planning

Flaps Up

WEIGHT (1000 KG)	TOTAL FUEL FLOW (KG/HR) PRESSURE ALTITUDE (FT) 1500	5000	10000	15000	20000	25000	30000	35000	41000
80	2890	2850	2830	2810	2770	2780	2850		
75	2720	2680	2650	2640	2590	2590	2650	2800	
70	2560	2510	2490	2470	2420	2400	2450	2540	
65	2400	2350	2320	2290	2260	2220	2270	2320	
60	2230	2190	2160	2130	2100	2040	2080	2110	
55	2070	2030	1990	1960	1930	1880	1900	1920	2100
50	1910	1860	1830	1800	1760	1720	1720	1760	1860
45	1760	1700	1660	1660	1620	1600	1570	1580	1650
40	1640	1580	1530	1490	1460	1440	1420	1400	1460
35	1480	1430	1380	1340	1310	1280	1270	1240	1280
30	1330	1290	1230	1190	1160	1140	1110	1100	1110

This table includes 5% additional fuel for holding in a racetrack pattern.

Flight Crew Oxygen Requirements

Required Pressure (PSI) for 76 Cu. Ft. Cylinder

BOTTLE TEMPERATURE		NUMBER OF CREW USING OXYGEN		
°C	°F	2	3	4
50	122	735	1055	1360
45	113	725	1040	1340
40	104	715	1020	1320
35	95	700	1005	1300
30	86	690	990	1280
25	77	680	975	1255
20	68	670	960	1240
15	59	655	940	1215
10	50	645	925	1195
5	41	635	910	1175
0	32	620	890	1150
-5	23	610	875	1130
-10	14	600	860	1110

Required Pressure (PSI) for 114/115 Cu. Ft. Cylinder

BOTTLE TEMPERATURE		NUMBER OF CREW USING OXYGEN		
°C	°F	2	3	4
50	122	530	735	945
45	113	520	725	930
40	104	510	715	915
35	95	505	700	900
30	86	495	690	885
25	77	485	680	870
20	68	480	670	860
15	59	470	655	840
10	50	460	645	830
5	41	455	635	815
0	32	445	620	800
-5	23	440	610	785
-10	14	430	600	770

ENGINE INOP

MAX CONTINUOUS THRUST

Net Level Off Weight

PRESSURE ALTITUDE (1000 FT)	LEVEL OFF WEIGHT (1000 KG)		
	ISA +10°C & BELOW	ISA + 15°C	ISA + 20°C
30	43.0	41.7	
28	46.5	45.0	43.6
26	50.3	48.6	47.1
24	53.3	51.7	50.0
22	55.8	53.9	51.8
20	58.0	55.6	52.8
18	59.2	56.2	53.2
17	59.3	56.2	53.3
16	59.5	56.5	53.7
15	60.1	57.2	54.2
14	61.4	58.5	55.5
12	64.2	61.0	57.9
10	67.0	63.7	60.4
8	69.8	66.3	62.9
6	72.6	69.0	65.5
4	75.3	71.6	68.1
2	78.0	74.3	70.7
0	80.9	76.7	73.0

Anti-Ice Adjustments

ANTI-ICE CONFIGURATION	LEVEL OFF WEIGHT ADJUSTMENT (1000 KG)														
	PRESSURE ALTITUDE (1000 FT)														
	0	2	4	6	8	10	12	14	15	16	17	18	20	22	24
ENGINE ONLY	-1.5	-1.7	-1.9	-2.0	-2.1	-2.1	-2.0	-1.9	-1.8	-1.8	-1.8	-1.9	-1.9	-1.6	-1.4
ENGINE & WING	-7.5	-7.6	-7.9	-8.0	-8.1	-8.0	-7.6	-7.2	-6.8	-6.8	-6.6	-6.5	-6.6	-6.1	-5.2

ALL ENGINES

Long Range Cruise Critical Fuel Reserves

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
290	266	246	228	213	200	188	178	169	160	153
593	541	497	460	428	400	376	354	335	317	302
897	816	749	692	643	600	563	530	501	474	451
1201	1091	1000	923	857	800	750	706	667	631	600
1505	1367	1252	1155	1072	1000	937	882	832	788	749
1809	1642	1504	1387	1287	1200	1124	1058	998	945	898
2113	1917	1755	1618	1501	1400	1312	1234	1164	1102	1047
2417	2193	2007	1850	1716	1600	1499	1409	1330	1260	1196
2721	2468	2259	2082	1931	1800	1686	1585	1496	1417	1345

Critical Fuel (1000 KG)

AIR DIST (NM)	WEIGHT AT CRITICAL POINT (1000 KG)								
	40	45	50	55	60	65	70	75	80
200	1.8	1.8	1.9	2.0	2.1	2.1	2.2	2.3	2.4
300	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3
400	3.2	3.3	3.4	3.6	3.7	3.8	4.0	4.1	4.2
500	3.9	4.1	4.2	4.4	4.5	4.7	4.8	5.0	5.2
600	4.6	4.8	5.0	5.2	5.3	5.5	5.7	5.9	6.1
700	5.3	5.5	5.7	5.9	6.1	6.3	6.6	6.8	7.0
800	6.0	6.2	6.5	6.7	6.9	7.2	7.4	7.6	7.9
900	6.7	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.8
1000	7.4	7.7	7.9	8.2	8.5	8.8	9.1	9.4	9.7
1100	8.2	8.4	8.7	9.0	9.3	9.6	9.9	10.3	10.6
1200	8.9	9.1	9.4	9.8	10.1	10.4	10.8	11.1	11.5
1300	9.6	9.8	10.1	10.5	10.9	11.2	11.6	12.0	12.3
1400	10.3	10.5	10.9	11.3	11.7	12.0	12.4	12.8	13.2
1500	11.0	11.2	11.6	12.0	12.4	12.8	13.2	13.7	14.1
1600	11.7	11.9	12.3	12.7	13.2	13.6	14.0	14.5	15.0
1700	12.4	12.6	13.0	13.5	13.9	14.4	14.9	15.3	15.8
1800	13.1	13.3	13.7	14.2	14.7	15.2	15.7	16.2	16.7

Based on: Emergency descent to 10000 ft. Level cruise at 10000 ft. 250 KIAS descent to 1500 ft. 15 minute hold at 1500 ft. One missed approach; approach and land. 5% allowance for wind errors.
Increase fuel required 0.5% for each 10°C hotter than ISA conditions.
If icing conditions exists, increase fuel by 16% to account for engine and wing anti-ice on (6%) and ice accumulation on unheated surfaces (10%).
Allowance for performance deterioration not included.
Compare the fuel required from this chart with critical fuel reserves for one engine inoperative and use the higher of the two.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Critical Fuel Reserves

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
295	269	248	230	214	200	188	177	168	159	151
604	548	502	463	429	400	375	352	333	315	299
914	827	756	696	644	600	561	528	497	471	447
1224	1106	1010	929	860	800	748	703	662	627	594
1533	1385	1264	1162	1075	1000	935	878	827	782	742
1843	1665	1518	1395	1290	1200	1122	1053	992	938	890
2153	1944	1772	1628	1505	1400	1309	1228	1157	1094	1037
2462	2223	2026	1861	1721	1600	1495	1403	1322	1250	1185
2772	2502	2280	2094	1936	1800	1682	1579	1487	1406	1333

Critical Fuel (1000 KG)

AIR DIST (NM)	WEIGHT AT CRITICAL POINT (1000 KG)								
	40	45	50	55	60	65	70	75	80
200	1.6	1.6	1.7	1.8	1.9	2.0	2.0	2.1	2.2
300	2.2	2.3	2.4	2.5	2.6	2.7	2.8	3.0	3.1
400	2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	3.9
500	3.4	3.6	3.8	3.9	4.1	4.3	4.5	4.6	4.8
600	4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.5	5.7
700	4.7	4.9	5.1	5.4	5.6	5.8	6.1	6.3	6.5
800	5.3	5.6	5.8	6.1	6.3	6.6	6.9	7.1	7.4
900	5.9	6.2	6.5	6.8	7.0	7.3	7.6	7.9	8.2
1000	6.5	6.8	7.1	7.4	7.8	8.1	8.4	8.7	9.1
1100	7.2	7.4	7.8	8.1	8.5	8.8	9.2	9.6	9.9
1200	7.8	8.1	8.4	8.8	9.2	9.6	10.0	10.4	10.8
1300	8.4	8.7	9.1	9.5	9.9	10.3	10.8	11.2	11.6
1400	9.0	9.3	9.7	10.2	10.6	11.1	11.5	11.9	12.4
1500	9.6	9.9	10.4	10.9	11.3	11.8	12.3	12.7	13.2
1600	10.3	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0
1700	10.9	11.2	11.7	12.2	12.7	13.2	13.7	14.3	14.8
1800	11.5	11.8	12.3	12.8	13.4	13.9	14.5	15.1	15.6

Based on: Emergency descent to 10000 ft. Level cruise at 10000 ft. 250 KIAS descent to 1500 ft. 15 minutes hold at 1500 ft. One missed approach; approach and land. 5% allowance for wind errors.
Increase fuel required 0.5% for each 10°C hotter than ISA conditions.
If icing conditions exists, increase fuel by 15% to account for engine and wing anti-ice on (7%) and ice accumulation on unheated surfaces (8%).
Allowance for performance deterioration not included.
Compare the fuel required from this chart with critical fuel reserves for all engines operative and use the higher of the two.

Intentionally
Blank

Landing Field Limit Weight - Dry Runway
Flaps 40
Based on anti-skid operative and automatic speedbrakes
Wind Corrected Field Length (FT)

FIELD LENGTH AVAILABLE (FT)	WIND COMPONENT (KTS)							
	-15	-10	-5	0	10	20	30	40
3000			2680	3000	3200	3400	3610	3840
3400		2740	3060	3400	3610	3820	4050	4290
3800	2790	3110	3440	3800	4020	4250	4480	4740
4200	3140	3480	3830	4200	4430	4670	4920	5190
4600	3490	3840	4210	4600	4840	5090	5350	5640
5000	3850	4210	4590	5000	5250	5510	5790	6090
5400	4200	4580	4970	5400	5660	5930	6220	6540
5800	4550	4950	5350	5800	6070	6350	6660	6990
6200	4910	5320	5730	6200	6480	6770	7090	7430
6600	5260	5680	6120	6600	6890	7190	7530	7880
7000	5610	6050	6500	7000	7300	7620	7960	8330
7400	5970	6420	6880	7400	7710	8040	8400	8780
7800	6320	6790	7260	7800	8120	8460	8830	9230
8200	6670	7160	7640	8200	8530	8880	9270	9680
8600	7030	7530	8030	8600	8940	9300	9700	10130
9000	7190	7690	8190	9000	9350	9720	10140	10580
9400	7350	7850	8350	9400	9760	10140	10570	
9800	7520	8020	8520	9800	10170	10560		
10200	7680	8180	8680	10200	10580			
10600	7850	8350	8850	10600				

Field Limit Weight (1000 KG)

WIND CORR'D FIELD LENGTH (FT)	AIRPORT PRESSURE ALTITUDE (FT)					
	0	2000	4000	6000	8000	10000
3400	38.7					
3800	45.3	42.6	40.0			
4200	51.9	48.8	45.9	43.1	40.4	
4600	57.4	54.8	51.9	48.8	45.8	42.8
5000	62.5	59.7	56.9	54.2	51.1	47.8
5400	67.7	64.4	61.4	58.4	55.6	52.6
5800	73.2	69.4	65.8	62.5	59.5	56.5
6200	78.6	74.4	70.5	66.7	63.3	60.1
6600	82.1	79.1	75.2	71.1	67.3	63.7
7000		82.5	79.4	75.6	71.4	67.5
7400			82.6	79.5	75.6	71.3
7800				82.4	79.3	75.2
8200					82.1	78.9
8600						81.3

Decrease field limit weight by 4500 kg when using manual speedbrakes.

Landing Field Limit Weight - Dry Runway

Flaps 40

Based on anti-skid inoperative and manual speedbrakes

Wind Corrected Field Length (FT)

FIELD LENGTH AVAILABLE (FT)	WIND COMPONENT (KTS)							
	-15	-10	-5	0	10	20	30	40
6000				6000	6450	7010	7500	8060
6400				6400	6860	7430	7940	8500
6800			5980	6800	7280	7860	8370	8950
7200			6370	7200	7690	8280	8810	9390
7600		5940	6750	7600	8100	8700	9250	9840
8000		6310	7140	8000	8510	9130	9680	10290
8400	5850	6690	7530	8400	8920	9550	10120	10730
8800	6210	7060	7910	8800	9340	9970	10550	11180
9200	6570	7430	8300	9200	9750	10400	10990	11620
9600	6930	7800	8680	9600	10160	10820	11430	12070
10000	7290	8180	9070	10000	10570	11240	11860	12520
10400	7650	8550	9450	10400	10980	11670	12300	12960
10800	8010	8920	9840	10800	11400	12090	12740	13410
11200	8370	9290	10230	11200	11810	12510	13170	13860
11600	8730	9670	10610	11600	12220	12940	13610	14300
12000	9090	10040	11000	12000	12630	13360	14050	14750
12400	9450	10410	11380	12400	13040	13790	14480	15190
12800	9810	10780	11770	12800	13460	14210	14920	15640
13200	10170	11160	12150	13200	13870	14630	15350	16090
13600	10530	11530	12540	13600	14280	15060	15790	16530

Field Limit Weight (1000 KG)

WIND CORR'D FIELD LENGTH (FT)	AIRPORT PRESSURE ALTITUDE (FT)					
	0	2000	4000	6000	8000	10000
6800	39.1					
7200	42.2	39.6				
7600	45.4	42.6	39.6			
8000	48.5	45.5	42.4	39.6		
8400	51.6	48.5	45.2	42.3	39.4	
8800	54.8	51.5	48.0	44.9	41.9	39.0
9200	58.0	54.5	50.9	47.6	44.4	41.4
9600	61.1	57.5	53.7	50.2	46.9	43.7
10000	64.3	60.5	56.5	52.8	49.5	46.0
10400	67.6	63.4	59.3	55.4	51.9	48.3
10800	71.1	66.4	62.0	58.0	54.3	50.6
11200	74.6	69.6	64.7	60.6	56.7	52.9
11600	78.0	72.8	67.6	63.1	59.1	55.1
12000	81.1	76.1	70.6	65.7	61.4	57.3
12400		79.1	73.6	68.5	63.8	59.6
12800		82.1	76.7	71.3	66.3	61.8
13200			79.5	74.1	68.9	64.0
13600			82.3	77.0	71.5	66.3
14000				79.6	74.1	68.8
14400				82.2	76.9	71.2
14800					79.3	73.6
15200					81.7	76.2
15600						78.6
16000						80.8
16400						83.1

Landing Field Limit Weight - Wet Runway

Flaps 40

Based on anti-skid operative and automatic speedbrakes

Wind Corrected Field Length (FT)

FIELD LENGTH AVAILABLE (FT)	WIND COMPONENT (KTS)							
	-15	-10	-5	0	10	20	30	40
3000				3000	3220	3440	3660	3910
3400			3030	3400	3630	3860	4100	4360
3800		3050	3420	3800	4040	4280	4540	4810
4200	3060	3420	3800	4200	4450	4700	4970	5260
4600	3410	3780	4180	4600	4860	5120	5410	5710
5000	3760	4150	4560	5000	5270	5550	5840	6160
5400	4120	4520	4940	5400	5680	5970	6280	6610
5800	4470	4890	5320	5800	6090	6390	6710	7060
6200	4820	5260	5710	6200	6500	6810	7140	7510
6600	5180	5630	6090	6600	6910	7230	7580	7950
7000	5530	5990	6470	7000	7320	7650	8010	8400
7400	5880	6360	6850	7400	7730	8070	8450	8850
7800	6230	6730	7230	7800	8140	8490	8890	9300
8200	6590	7100	7620	8200	8550	8920	9320	9750
8600	6940	7470	8000	8600	8960	9340	9750	10200
9000	7290	7830	8380	9000	9370	9760	10190	10650
9400	7650	8200	8760	9400	9780	10180	10620	11100
9800	8000	8570	9140	9800	10190	10600	11060	11550
10200	8210	8780	9360	10200	10600	11020	11500	12000
10600	8370	8950	9520	10600	11010	11440	11930	

Field Limit Weight (1000 KG)

WIND CORR'D FIELD LENGTH (FT)	AIRPORT PRESSURE ALTITUDE (FT)					
	0	2000	4000	6000	8000	10000
4200	42.8	40.3				
4600	48.6	45.7	42.9	40.3		
5000	54.2	51.2	48.1	45.2	42.4	39.7
5400	58.7	56.0	53.4	50.1	47.1	44.0
5800	63.0	60.2	57.4	54.6	51.6	48.3
6200	67.6	64.3	61.3	58.3	55.5	52.5
6600	72.4	68.6	65.1	61.9	58.9	55.9
7000	77.2	73.0	69.1	65.5	62.2	59.1
7400	80.7	77.5	73.2	69.3	65.6	62.2
7800		80.7	77.4	73.1	69.2	65.4
8200			80.5	77.1	72.7	68.7
8600			83.2	80.1	76.5	72.1
9000				82.6	79.5	75.5
9400					81.9	78.7
9800						80.8
10200						82.9

Decrease field limit weight by 4500 kg when using manual speedbrakes.

Landing Field Limit Weight - Wet Runway

Flaps 40

Based on anti-skid inoperative and manual speedbrakes

Wind Corrected Field Length (FT)

FIELD LENGTH AVAILABLE (FT)	WIND COMPONENT (KTS)							
	-15	-10	-5	0	10	20	30	40
6000					6490	7110	7640	8260
6400					6910	7530	8080	8710
6800				6800	7320	7950	8520	9150
7200				7200	7730	8380	8950	9600
7600			6670	7600	8140	8800	9390	10040
8000			7050	8000	8550	9230	9820	10490
8400		6520	7440	8400	8970	9650	10260	10940
8800		6890	7830	8800	9380	10070	10700	11380
9200		7260	8210	9200	9790	10500	11130	11830
9600	6680	7630	8600	9600	10200	10920	11570	12270
10000	7040	8010	8980	10000	10610	11340	12010	12720
10400	7400	8380	9370	10400	11030	11770	12440	13170
10800	7760	8750	9750	10800	11440	12190	12880	13610
11200	8120	9120	10140	11200	11850	12610	13320	14060
11600	8480	9500	10530	11600	12260	13040	13750	14510
12000	8840	9870	10910	12000	12670	13460	14190	14950
12400	9200	10240	11300	12400	13090	13880	14620	15400
12800	9560	10610	11680	12800	13500	14310	15060	15840
13200	9920	10990	12070	13200	13910	14730	15500	16290
13600	10280	11360	12450	13600	14320	15150	15930	16740

Field Limit Weight (1000 KG)

WIND CORR'D FIELD LENGTH (FT)	AIRPORT PRESSURE ALTITUDE (FT)					
	0	2000	4000	6000	8000	10000
8000	40.3					
8400	43.0	40.4				
8800	45.8	43.0	40.0			
9200	48.5	45.5	42.4	39.6		
9600	51.2	48.1	44.8	41.9	39.1	
10000	54.0	50.7	47.3	44.2	41.3	38.4
10400	56.7	53.3	49.7	46.5	43.4	40.4
10800	59.5	55.9	52.2	48.9	45.6	42.5
11200	62.2	58.5	54.7	51.1	47.8	44.5
11600	65.0	61.1	57.1	53.4	50.0	46.5
12000	67.9	63.6	59.5	55.7	52.1	48.5
12400	71.0	66.3	61.9	57.9	54.2	50.5
12800	74.0	69.0	64.3	60.2	56.3	52.5
13200	77.1	71.8	66.7	62.4	58.3	54.4
13600	79.8	74.6	69.3	64.6	60.4	56.4
14000	82.5	77.5	71.9	66.9	62.5	58.3
14400		80.0	74.5	69.3	64.5	60.2
14800		82.6	77.2	71.7	66.7	62.2
15200			79.7	74.2	69.0	64.1
15600			82.0	76.7	71.2	66.1
16000				79.1	73.5	68.2
16400				81.3	75.9	70.3
16800				83.5	78.2	72.5
17200					80.3	74.6
17600					82.3	76.9

Landing Climb Limit Weight

Valid for approach with Flaps 15 and landing with Flaps 40

Based on engine bleed for packs on and anti-ice off

AIRPORT OAT		LANDING CLIMB LIMIT WEIGHT (1000 KG)			
		AIRPORT PRESSURE ALTITUDE (FT)			
°C	°F	0	1000	2000	3000
50	122	51.4	51.1	50.6	
48	118	52.5	52.1	51.7	51.3
46	115	53.6	53.2	52.7	52.3
44	111	54.6	54.4	53.8	53.4
42	108	55.8	55.5	55.0	54.5
40	104	56.9	56.6	56.1	55.6
38	100	58.0	57.7	57.3	56.7
36	97	59.2	58.9	58.4	57.9
34	93	60.3	60.0	59.5	59.0
32	90	61.6	61.2	60.7	60.2
30	86	62.8	62.4	62.0	61.3
28	82	62.9	62.5	62.2	61.7
26	79	63.0	62.6	62.3	61.7
24	75	63.0	62.6	62.3	61.8
22	72	63.1	62.7	62.4	61.8
20	68	63.1	62.7	62.4	61.8
18	64	63.2	62.8	62.5	61.9
16	61	63.2	62.8	62.5	61.9
14	57	63.2	62.8	62.5	62.0
12	54	63.3	62.9	62.6	62.0
10	50	63.3	62.9	62.6	62.0
-40	-40	63.8	63.4	63.1	62.5

With engine bleed for packs off, increase weight by 1400 kg.
With engine anti-ice on, decrease weight by 150 kg.
With engine and wing anti-ice on, decrease weight by 750 kg (optional system).
When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 5150 kg.

ENGINE INOP

Go-Around Climb Gradient

Flaps 15

Based on engine bleed for packs on and anti-ice off

OAT (°C)	REFERENCE GO-AROUND GRADIENT (%) PRESSURE ALTITUDE (FT)					
	0	2000	4000	6000	8000	10000
54	1.46					
50	1.98	1.79				
46	2.50	2.30	2.09			
42	3.05	2.86	2.59	1.63		
38	3.61	3.41	3.16	2.08	0.72	
34	4.18	3.97	3.71	2.59	1.14	
30	4.78	4.57	4.26	3.09	1.63	0.11
29	4.79	4.63	4.35	3.21	1.75	0.23
26	4.81	4.65	4.37	3.58	2.10	0.56
25	4.82	4.65	4.37	3.67	2.21	0.67
22	4.84	4.67	4.39	3.68	2.56	1.00
18	4.86	4.69	4.41	3.69	3.00	1.43
14	4.88	4.71	4.42	3.71	3.04	1.89
10	4.91	4.73	4.44	3.72	3.05	2.36
6	4.93	4.75	4.46	3.74	3.06	2.38
2	4.94	4.77	4.47	3.75	3.08	2.39

Gradient Adjustment for Weight (%)

WEIGHT (1000 KG)	REFERENCE GO-AROUND GRADIENT (%)					
	0	1	2	3	4	5
70	-2.87	-3.26	-3.56	-3.87	-4.18	-4.48
65	-2.33	-2.65	-2.89	-3.14	-3.39	-3.63
60	-1.71	-1.94	-2.11	-2.29	-2.47	-2.64
55	-0.94	-1.06	-1.15	-1.25	-1.35	-1.44
50	0.00	0.00	0.00	0.00	0.00	0.00
45	1.14	1.26	1.38	1.51	1.64	1.77
40	2.61	2.87	3.14	3.42	3.72	4.02

Gradient Adjustment for Speed (%)

SPEED (KIAS)	WEIGHT ADJUSTED GO-AROUND GRADIENT (%)										
	0	1	2	3	4	5	6	7	8	9	10
VREF40	-0.35	-0.37	-0.38	-0.38	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39
VREF40+5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VREF40+10	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
VREF40+15	0.33	0.33	0.33	0.33	0.32	0.31	0.30	0.30	0.29	0.28	0.28
VREF40+20	0.39	0.37	0.36	0.34	0.32	0.30	0.28	0.27	0.26	0.25	0.23
VREF40+25	0.39	0.34	0.29	0.25	0.22	0.19	0.16	0.14	0.13	0.11	0.09
VREF40+30	0.31	0.22	0.14	0.08	0.03	-0.01	-0.04	-0.06	-0.08	-0.10	-0.13

With engine bleed for packs off, increase gradient by 0.3%.
With engine anti-ice on, decrease gradient by 0.1%.
With engine and wing anti-ice on, decrease gradient by 0.2% (optional system).
When operating in icing conditions during any part of the flight with forecast landing temperatures below 10°C decrease gradient by 0.9%.

Quick Turnaround Limit Weight
Flaps 40

OAT (°C)	LIMIT WEIGHT (1000 KG) AIRPORT PRESSURE ALTITUDE (FT)					
	0	2000	4000	6000	8000	10000
54	71.8					
50	72.3	69.4				
45	72.9	70.0	67.1			
40	73.5	70.6	67.7	64.9		
35	74.2	71.2	68.3	65.5	62.8	
30	74.9	71.8	68.9	66.0	63.4	60.8
25	75.6	72.5	69.5	66.6	63.9	61.3
20	76.3	73.1	70.1	67.2	64.4	61.8
15	77.0	73.8	70.8	67.8	65.0	62.4
10	77.7	74.5	71.4	68.5	65.6	62.9
5	78.4	75.2	72.1	69.1	66.2	63.5
0	79.1	76.0	72.8	69.8	66.9	64.1
-5	79.9	76.7	73.5	70.5	67.5	64.6
-10	80.6	77.5	74.3	71.2	68.2	65.3
-15	81.4	78.3	75.1	71.9	68.9	65.9
-20	81.6	79.0	75.9	72.7	69.6	66.6
-30	81.6	80.7	77.5	74.2	71.1	68.0
-40	81.6	81.6	79.2	75.9	72.7	69.6
-50	81.6	81.6	80.9	77.7	74.4	71.2
-54	81.6	81.6	81.6	78.4	75.1	71.8

Increase weight by 650 kg per 1% uphill slope. Decrease weight by 1150 kg per 1% downhill slope.
Increase weight by 1600 kg per 10 knots headwind. Decrease weight by 8000 kg per 10 knots tailwind.

After landing at weights exceeding those shown above, adjusted for slope and wind, wait at least 62 minutes and check that wheel thermal plugs have not melted before executing a subsequent takeoff.

As an alternate procedure, ensure that each brake pressure plate surface temperature, without artificial cooling, is less than 218°C as follows: No sooner than 10 and no later than 15 minutes after parking, measure each brake pressure plate surface temperature at a minimum of two points per brake by an accurate method (using a Doric Microtemp 450 hand held thermometer or equivalent, hold temperature probe in place for 20 seconds or until reading stabilizes). If each measured temperature is less than 218°C, immediate dispatch is allowed; otherwise the required minimum ground wait period of 62 minutes applies.

If a Brake Temperature Monitoring System (BTMS) is installed:

No sooner than 10 and no later than 15 minutes after parking, check the BRAKE TEMP light. If the BRAKE TEMP light is not on, no ground waiting period is required. If the BRAKE TEMP light is on, do not dispatch until at least 62 minutes after landing, or until all the BTMS readings on the systems Display are below 3.5 and the BRAKE TEMP light is off. Check that wheel thermal plugs have not melted before making a subsequent takeoff.
Note: If any brake temperature display digit is blank or indicates 0.0 or 0.1, then this method cannot be used.

Intentionally
Blank

Introduction

This chapter contains self dispatch performance data intended primarily for use by flight crews in the event that information cannot be obtained from the airline dispatch office. The takeoff data provided is for a single takeoff flap at max takeoff thrust. The range of conditions covered is limited to those normally encountered in airline operation. In the event of conflict between the data presented in this chapter and that contained in the approved Airplane Flight Manual, the Flight Manual shall always take precedence.

Takeoff

The maximum allowable takeoff weight will be the least of the Field, Climb and Obstacle Limit Weights as determined from the tables shown. Tire and Brake Energy Limits are not shown as they are not limiting for the range of conditions shown in this chapter.

JAROPS-1 requires that the runway length be adjusted to account for alignment of the airplane prior to takeoff. The table below provides TORA, TODA and ASDA adjustments for both 90 degree taxiway entry and 180 degree turnaround. For the 180 degree turnaround case, adjustments are provided for both a nominal 197 ft runway as well as the minimum required for the stated minimum pavement width. These values may be used when obtaining takeoff weights from the AFM or a takeoff analysis program. When using line-up allowances with the Field Length Limit chart, the field length available must be reduced by the ASDA adjustment.

	90 DEGREE TAXIWAY ENTRY	180 DEGREE TURNAROUND	
	MINIMUM LINE-UP DISTANCE (FT)	NOMINAL LINE-UP DISTANCE (FT) (197 FT RUNWAY)	MINIMUM LINE-UP DISTANCE (FT) (148 FT RUNWAY)
TORA & TODA	32	54	54
ASDA	74	95	95

Field Limit Weight - Slope and Wind Corrections

These tables for dry and wet runways provide corrections to the field length available for the effects of runway slope and wind component along the runway. Enter the appropriate table with the available field length and runway slope to determine the slope corrected field length. Next enter the appropriate table with slope corrected field length and wind component to determine the slope and wind corrected field length.

Field and Climb Limit Weight

Tables are presented for selected airport pressure altitudes and runway conditions and show both Field and Climb Limit Weights. Enter the appropriate table for pressure altitude and runway condition with "Slope and Wind Corrected Field Length" determined above and airport OAT to obtain Field Limit Weight. Also read Climb Limit Weight for the same OAT. Intermediate altitudes may be interpolated or use next higher altitude. When finding a maximum weight for a wet runway, the dry runway limit weight must also be determined and the lower of the two weights used.

Obstacle Limit Weight

The Reference Obstacle Limit Weight table provides obstacle limit weights for reference airport conditions based on obstacle height above the runway surface and distance from brake release. Enter the adjustment tables to adjust the reference Obstacle Limit Weight for the effects of OAT, pressure altitude and wind as indicated. In the case of multiple obstacles, enter the tables successively with each obstacle and determine the most limiting weight.

When using line-up allowances with the Obstacle Limit chart, the obstacle distance from brake release must be reduced by the ASDA adjustment.

Enroute

Long Range Cruise Maximum Operating Altitude

These tables provide the maximum operating altitude in the same manner as the FMC. Maximum altitudes are shown for a given cruise weight and maneuver capability. Note that this table considers both thrust and buffet limits, providing the more limiting of the two. Any data that is thrust limited is denoted by an asterisk and represents only a thrust limited condition in level flight with 100 ft/min residual rate of climb. Flying above these altitudes with sustained banks in excess of approximately 15° may cause the airplane to lose speed and/or altitude. The altitudes shown in the table are limited to the maximum certified altitude of 41000 ft.

Long Range Cruise Trip Fuel and Time

Long Range Cruise Trip Fuel and Time tables are provided to determine trip time and fuel required to destination.

To determine trip fuel and time for a constant altitude cruise, first enter the Ground to Air Miles Conversion table to convert ground distance and enroute wind to an equivalent still air distance for use with the Reference Fuel and Time tables. Next, enter the Reference Fuel and Time table with

air distance from the Ground to Air Miles Conversion table and the desired altitude and read Reference Fuel and Time Required. Lastly, enter the Fuel Required Adjustment table with the Reference Fuel and the planned landing weight to obtain the adjustment to the fuel required at the planned landing weight.

Long Range Cruise Step Climb Trip Fuel and Time

The Long Range Cruise Step Climb Trip Fuel and Time tables are provided to determine trip time and fuel required to destination when flying a step climb profile. Step climb profiles are based on 4000 ft step climbs to keep the flight within 2000 ft of the optimum altitude for the current cruise weight. To determine trip fuel and time, enter the Ground to Air Miles Conversion table and determine air distance as discussed above. Then enter the Trip Fuel and Time Required table with air distance and planned landing weight to read trip fuel. Continue across the table to read trip time.

Short Trip Fuel and Time

These tables are provided to determine trip fuel and time for short distances or alternates. Obtain air distance from the table using the ground distance and wind component to the alternate. Enter the Trip Fuel and Time Required table with air distance and read trip fuel required for the expected landing weight, together with time to alternate at right. For distances greater than shown or other altitudes, use the Long Range Cruise Trip Fuel and Time tables.

Holding Planning

This table provides total fuel flow information necessary for planning flaps up holding and reserve fuel requirements. Data is based on the FMC holding speed schedule which is the higher of the maximum endurance and flaps up maneuver speeds. As noted, the fuel flow is based on flight in a racetrack holding pattern. For holding in straight and level flight, reduce table values by 5%.

Flight Crew Oxygen Requirements

Regulations require that sufficient oxygen be provided to the flight crew to account for the greater of supplemental breathing oxygen in the event of a cabin depressurization or protective breathing in the event of smoke or harmful fumes in the flight deck. The oxygen quantity associated with the above requirements is achieved with the minimum dispatch oxygen cylinder pressure.

To determine the minimum dispatch oxygen cylinder pressure enter the appropriate flight crew oxygen table with the number of crew plus observers using oxygen and read the minimum cylinder pressure required for the appropriate cylinder temperature.

Net Level Off Weight

The Net Level Off Weight table is provided to determine terrain clearance capability in straight and level flight following an engine failure. Regulations require terrain clearance planning based on net performance which is the gross (or actual) gradient performance degraded by 1.1%. In addition, the net level off pressure altitude must clear the terrain by 1000 ft.

To determine the maximum weight for terrain clearance, enter the table with required net level off pressure altitude and expected ISA deviation to obtain weight. Adjust weight for anti-ice operation as noted below the table.

Extended Range Operations

Regulations require that flights conducted over a route that contains a point further than one hour's time at "normal one engine inoperative speed" from an adequate diversion airport comply with rules set up specifically for "Extended Range Operation with Two Engine airplanes." This section provides reserve fuel planning information for the "Critical Fuel Scenario" based on two engine operation at Long Range Cruise as well as single engine operation at Long Range Cruise.

Long Range Cruise Critical Fuel Reserves

Enter the Ground to Air Miles Conversion table with forecast wind and ground distance to diversion airport from critical point to obtain air distance. Now enter the Critical Fuel table with air distance and expected weight at the critical point and read required fuel. Apply the noted fuel adjustments as necessary. Regulations require a 5% allowance for performance deterioration unless a value has been established by the operator for inservice deterioration.

As noted below each table, the fuel required is the greater of the two engine fuel and the single engine fuel. This fuel is compared to the amount of fuel normally onboard the airplane at that point in the route. If the fuel required by the critical fuel reserves exceeds the amount of fuel normally expected, the fuel load must be adjusted accordingly.

Landing

Tables are provided for determining the maximum landing weight as limited by field length or climb requirements for a single landing flap.

Maximum landing weight is the lowest of the field length limit weight, climb limit weight, or maximum certified landing weight.

Landing Field Limit Weight

For the expected runway condition and anti-skid system configuration, obtain wind corrected field length by entering the Wind Corrected Field Length table with field length available and wind component along the runway. Now enter the Field Limit Weight table with wind corrected field length and pressure altitude to read field limit weight.

Landing Climb Limit Weight

Enter the table with airport OAT and pressure altitude to read landing climb limit weight. Apply the noted adjustments as required.

Go-Around Climb Gradient

Enter the Reference Go-Around Gradient table with airport OAT and pressure altitude to determine the reference go-around gradient. Then adjust the reference gradient for airplane weight and speed using the tables provided to determine the weight and speed adjusted go-around gradient. Apply the necessary corrections for engine bleed configuration and icing conditions as noted.

Quick Turnaround Limit Weight

Enter the table with airport pressure altitude and OAT to read maximum quick turnaround weight. Apply the noted adjustments as required.

If the landing weight exceeds the maximum quick turnaround weight, wait the specified time and then check that the wheel thermal plugs have not melted before executing a subsequent takeoff, or ensure the brake temperature is within limits using the alternate procedure described on the page.

Gear Down

This section provides flight planning data for revenue operation with gear down. Unless otherwise noted, the gear down tables in this section are identical in format and usage to the corresponding gear up tables previously described.

Takeoff/Landing Climb Limit Weight

Enter the appropriate table with airport OAT and pressure altitude to determine Takeoff/Landing Climb Limit Weight with gear down. Correct the weight obtained for engine bleed configuration as required.